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CALCULATION OF "NORMAL" WEIGHT IN CHILDREN

(By Means of Nomograms Based on Selected Anthropometric Measurements)

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INTRODUCTION

"Normal" weight may be defined as that weight which a particular individual should enjoy under optimal nutritional conditions. "Normal" weight is indicative of an "ideal" balance of soft tissues (muscle, subcutaneous and adipose tissue) on that particular bony skeleton (8). Weight is markedly influenced not only by height, age and sex, but also by bodily habitus and genetic constitution.

Pediatricians have generally recognized a relationship between physical health and fitness on the one hand and adequacy of body size, bodily proportions and weight on the other. Regular and reasonable gain of weight during infancy and childhood has become accepted as one of the indications of satisfactory health and nutrition; and the failure to gain, as distinct evidence and warning that something is amiss. In addition to weight, periodic anthropometric measurements have for some time been recognized as essential adjuncts for the appraisal of the physical status of a child. However, the accumulation, recording, and interpretation of these measurements have been cumbersome and inadequate for the general practitioner of medicine and dentistry, and as a result greatly neglected by him.

This paper represents an effort to present a simplified but accurate method for calculating the "normal" weight of a child incidental to the complete assessment of his physical development.

REVIEW OF THE LITERATURE

One of the first methods of assessing "normal" weight to gain wide popularity was the use of "standard" tables, listing average weight values for each age, height and sex (1). Although such tables are still in widespread use, they possessed obvious limitations since the influence of body type on weight was omitted. A constitutionally slender person was pre-

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sumed to have the same weight as a stocky person. This is obviously incorrect. Pryor and Stolz (19) showed that just the addition of a single measurement indicative of body type (bi-cristal diameter) made such tables thirty-three per cent more accurate.

The ACH (arm-chest-hip) Index, developed and published by the American Child Health Association in 1934 (4), was designed to screen out children who needed medical examinations because of extremely small amounts of muscular and subcutaneous tissue. This index was tested by Jenss and Souther (5) and found to be insensitive to many cases which had been picked out as deficient by other criteria, usually clinical. In addition, errors in the measurement of hip width and chest depth were so large when taken over clothing, that these measurements were impractical for use in the school situation or dental practitioner's office.

In 1935, Franzen and co-workers devised Nutritional Status Indices in terms of weight, muscle size, and amount of subcutaneous tissue. The most serious objection to this system has been the difficulty in devising an accurate and objective method of measuring the amount of subcutaneous tissue. Also, it has not been shown that the amount of fat and muscle of the upper arm is representative of the subcutaneous tissue in the rest of the body, as was suggested. In fact, Meredith (10) pointed out the absence of such correlations in boys aged 12 to 20 years.

Pryor (20) proposed the use of weight tables based upon height and biiliac diameter. These tables represented a marked improvement over the Baldwin-Wood tables since a second body dimension—the bi-cristal diameter—was included. However, the addition of bi-cristal diameter alone failed to include the third body dimension (thickness). Jenss and Souther (5), in testing the physical fitness of a group of 713 seven-year-old Connecticut children, found that the early Pryor tables were not sufficiently sensitive for the assessment of the fitness of their group. In 1941, Pryor published a revised set of tables (21) in which three types of chest—narrow, medium and large—were recognized and incorporated into the tables for weight prediction. These tables have a greater predictive value because the factor of body build (as judged by the size of the chest and by the bicristal diameter) is included in the calculation.

McCloy (8, 9) conducted an extensive and intensive study of the problem of calculating "normal" or "ideal" weight in children. On the basis of his studies, McCloy recommended the use of five "basic" measurements as essential for the accurate assessment of the child: weight, height, hip width, chest circumference, and leg girth. He found calf girth to be one of the best of all the measurements (which he evaluated by means of multiple regression equations) for the prediction of "normal" weight. Chest circumference was also a valuable predictor of "normal" weight. In addition, he suggested that the width of elbow or knee, and girths of upper arm, forearm, and thigh be taken for the sake of completeness as well as measurements of the thickness of the skin and subcutaneous tissue by means of

a spring caliper designed by Franzen. His tables also called for a correction for the amount of fat. Many authors doubt that the increased accuracy achieved by this large number of measurements warrants their consideration for office procedures.

Dearborn and Rothney (3) presented a regression equation for predicting "normal" body weight for boys and girls fourteen to eighteen years of age, using chest depth, chest width, standing height, and iliac width. They found their formula to be twenty per cent more effective than the Baldwin-Wood height-age tables.

O'Brien and Girshick (18) measured the neck-base girth and maximum calf girth in 65,000 children, aged four to fourteen years. The intercorrelation of calf girth and weight was found to be .948, while that of neck-base girth and weight was .889.

The use of nomographic profiles to determine "normal" weight was demonstrated by Massler (7). He incorporated chest circumference (at quiet expiration) and height into a formula for the calculation of weight. The study was based on more than 1000 males and females in optimal health and nutritional status. They ranged in age from birth to fifty years. The coefficient of correlation between the calculated and observed weights was found to be +.82.

Body Build

In all of these studies, it was evident that the factor of body build could not be omitted from any attempt to predict "normal" weight. Two methods of estimating body build are in general use today—the subjective method as suggested by Sheldon and Tucker (24) and the more objective grid method as suggested by Wetzel (28).

Subjective Method of Somatotyping. This method depends on the simple inspection of the physical characteristics of the individual by the observer. This method of somatotyping was elaborated and described in detail by Sheldon and Tucker (24). They described three basic morphologic types (ectomorph, mesomorph and endomorph) with a great number of intermediary gradations and combinations. For this study, a series of seven common body types, from slender to stocky, were used in order to simplify the procedure of somatotyping. Figure 1 illustrates the body lines typical of children in each of the seven groups.

Whereas subjective somatotyping of *adults* can be done with accuracy (24), this assessment is more difficult in children. One cannot easily foretell the adult body type and constitution from the examination of the prepubescent child who has not yet fulfilled his growth potentials. Only a fair degree of accuracy in the somatotyping of children should be expected.

Wetzel's Grid Method. On the basis of height and weight alone, Wetzel (28) proposed a scheme of nine groups or channels ranging from the extreme (obese) endomorphic child (A_4) through the mesomorphic (M) to the extreme (thin) ectomorphic child (B_4) with gradations between

these values. Wetzel thus combined the factor of body type with that of weight. Although Wetzel's method does not take into account the individual contributions of musculature and subcutaneous tissue in different areas of the body, these channels do present an objective and accurate picture of the child's bodily habitus at the moment. The predictive value of the grid is more evident after several recordings have been made and several years have passed.

Intensive studies carried out during recent years have shown that while a wide range of difference exists among children of the same age, individuals tend to remain in a relatively stable position with respect to the normal distribution, from period to period. Except during the period of adolescence, children tend to grow in an orderly and predictable manner (11). The most recent study on this subject was offered by Stuart and Meredith in 1946 and 1947 (26). They published a complete series of body measurements taken at half-yearly age intervals from 5 to 18 years and arranged in a decile distribution from smallest to largest, for use in school health programs. These tables enable the examiner to locate the relative position of each one of the several body measurements taken. Cross-sectional or longitudinal data may be analyzed with equal facility. The examiner may then interpret the whole set of data or any one of the individual measurements as he sees fit. This system has the great virtue of avoiding the tendency to "classify" a given child and permits greater flexibility in interpretation by the examiner, yet offers an objective guide to his judgment.

Material and Methods

The present study is based on 3200 measurements taken on a group of 531 white, American children, of whom 42.7 per cent were girls, and 57.3 per cent boys, ranging in age from 5 years 4 months to 17 years 6 months. All of the children were residents of the Mooseheart home for orphaned children, located at Mooseheart, Illinois. The children came from every state in the United States and had been in residence at this institution for an average of three to four years, ranging from two months to thirteen years. (Only twenty-one children, or 3.95 per cent of the total group had been residents for three months or less). Ages were revised to the nearest half-birthday to facilitate analysis.

No acute or chronically ill children were included, nor were any children included whose physical condition was not rated as "good" by staff physicians of the orphanage. This study is therefore based upon a group of children drawn from every state in the United States, who were in optimal physical health and nutritional status according to present standards. "The Mooseheart children, as a group, are undoubtedly above the average physically. Only physically normal children are admitted to the orphanage and an extensive program of 'preventive medicine,' including a selective diet, regular sleep, regular recreation, indoors and out, all contribute to an ex-

cellent record of physical standard and health. The death record has been only one-tenth of one percent during the last twenty-five years" (22). A study of the diet of the Mooseheart child by Johnston in 1943 showed that the diet of every child was excellent and that there were more children (4 out of 21) in excellent nutritive condition than are found in the usual public school (6). On these bases, this group of children can well be considered to approach a physically ideal group of American children.

The following measurements were taken of these children: height, weight, chest circumference at average respiration, chest circumference at quiet expiration, neck circumference, and calf circumference. During the examination nutritional status, amount of subcutaneous tissue at the mandibular and subscapular areas, and an estimation of the child's somatotype were recorded. The children were asked to remove shoes and all but a minimum of their light summer clothing.

The techniques used for these measurements were as follows:

a) *Body Weight.* An accurate standard type of scale was used to record the subject's weight in both pounds and kilograms. The children were required to stand still in the center of the platform and to keep their hands at their sides.

b) *Standing Height.* A millimeter scale was attached to the vertical bar of a special platform. The subject was placed as follows: heels, buttocks, shoulders, and rear of head firmly touching the vertical bar and scale; heels nearly together, toes slightly divergent; arms hanging at sides in a relaxed and natural manner; and the head placed so that the Frankfort horizontal plane (lower border of the orbit to the external auditory orifice) was parallel to the floor. A headpiece constructed of two narrow boards fixed at right angles to each other was then brought down upon the child's hair to contact firmly the top of his head. One leg of the right angle was kept against the scale. The reading was recorded in millimeters.

c) *Chest Circumference.* The lower end of the sternum (xiphoid process) was palpated, and a millimeter steel tape was passed around the chest at this level keeping the tape parallel to the floor. The median value obtained during ordinary respiration was recorded.

To obtain the measurement at quiet expiration, the subject was instructed to inhale deeply and then exhale naturally (not forced). The lowest end-point reading of two or more measurements was recorded. Care was taken that the subject did not hold his breath or give false readings because of nervousness (see instructions by Massler (7)).

d) *Calf Circumference.* The subject stood erect with the legs slightly apart and his weight equally distributed on both lower limbs. The millimeter tape was passed around the subject's left leg and the greatest girth of the calf at right angles to the long axis of the leg was recorded. Several different levels were tried in order to be certain that the largest circum-

ference was obtained. Care was taken not to obtain false readings by compression of tissues.

e) Neck Circumference. The tape was passed around the neck at the level of its smallest circumference and kept at right angles to the vertebral column. Care was taken not to compress the soft tissue of the neck. In the pubescent male, the tape was placed below the laryngeal prominence to prevent distortion by this secondary sex characteristic.

f) Somatotyping. Each child was classified according to a simplified numerical scale by visual estimation of his body build and general physique:

Group I — Extreme ectomorphy (extremely slender or thin)
Group II — Ectomorphy (slender)
Group III — Moderate ectomorphy (moderately slender)
Group IV — Mesomorphy (average build)
Group V — Moderate endomorphy (moderately stocky)
Group VI — Endomorphy (stocky)
Group VII — Extreme endomorphy (obese)

This estimation was necessarily subjective. In order to objectify this procedure as much as possible, two observers practiced the methods of somatotyping as described by Sheldon and Tucker (24) until a fair degree of agreement in their observation was obtained. A series of outline drawings were used to aid in this determination (Figure 1).

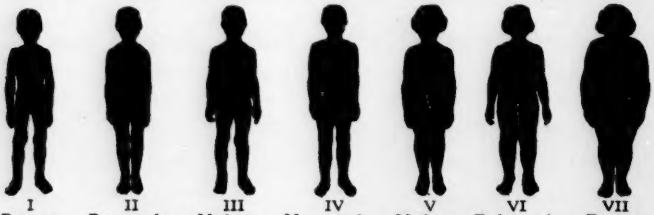

FIGURE 1—Silhouettes of seven body types in children.

FINDINGS

Correlation of Height-Circumference Ratios with Age

In order to determine the significance of the various girth measurements, each girth was related to the linear height of each child and the ratio thus obtained was plotted against age.

If a given girth to height ratio increases (or decreases) with age, then that girth must have increased more (or less) rapidly with age than did the height. Such a ratio indicates changes in body proportions that occur with

age. If, however, a given girth to height ratio remains fairly constant throughout the age range studied, it indicates constancy in these bodily proportions during growth. Such a ratio is therefore determined by the somatotype rather than by age. A *constant ratio indicates unchanging bodily proportions* which are determined by the somatotype in contrast to a changing ratio which indicates bodily changes which occur during development.

The height-calf girth ratio for boys and girls exhibited the lowest correlation with age (—.19 and +.04) whereas the height-neck girth ratio showed the highest correlation with age (+.55). This means that the neck circumference when related to height increased directly and significantly with the age of the child. Scammon (23) pointed out that neck girth, like head circumference, follows a neural type of growth in infancy and childhood and shows a marked parapuberal spurt consonant with general body growth. Calf girth, on the other hand, when related to height, does not change significantly with age.

The lack of correlation between the height-calf girth ratio and age was significant because it indicated the possibility that this ratio might be a typal characteristic. If this could be shown to be correct by actual testing, it forecasts the possible use of the calf circumference in a weight calculation formula which could disregard age. This would eliminate considerable unwieldiness caused by using different formulae for each age as suggested by McCloy (8).

Table I indicates that in boys there is also very little correlation between the height-chest circumference ratio and age (+.16). In girls the correlation is somewhat higher but still small (+.30). Examination of the data revealed that the correlation in girls is confined primarily to the earlier age period from 5½ to 13 years and is absent thereafter.

TABLE I

COEFFICIENTS OF CORRELATION OF HEIGHT-CALF, HEIGHT-CHEST, AND HEIGHT-NECK CIRCUMFERENCE RATIOS WITH AGE (5½ to 17½ YEARS)

Ratio	*Sex*	*Number of Children*	*Correlation with Age (r)**
Height/Calf Girth	M	304	+ .039
	F	227	— .192
Height/Chest Circumference (at average resp.)	M	304	+ .156
	F	227	+ .301
Height/Neck Circumference	M	302	+ .559
	F	227	+ .558

* Coefficient of correlation (*r*) was calculated by the Pearson product-moment method.

Correlation of Height-Circumference Ratios with Somatotypes

The constancy of the height-calf girth ratio throughout the age range studied suggested that this ratio might be a typal characteristic directly related to the somatotype of the child. If this latter relationship could be proved, it also suggested the possible use of the height-calf girth ratio as an objective method of determining the somatotypes of children. However, before this theory could be developed, it was necessary to test the correlation of the three height-girth ratios with the somatotype of each child. This analysis showed that of the three circumferences measured, the height-calf girth ratio showed the greatest correlation with both the "subjective" and Wetzel methods of somatotyping. The correlation between the height-calf girth ratio and the somatotype as determined by Wetzel's grid was especially high (+.812 and +.825). Since the correlation (r) between the subjective methods of somatotyping as we used them and Wetzel's more objective method was found to be only +.79, this indicated quite clearly that the height-calf girth ratio was actually a typal characteristic and was determined by the somatotype.

Noteworthy also was the fact that the correlation between the height-calf girth ratio and the somatotype was very high in both boys and girls. In the other two height-girth ratios, the girls showed significantly lower correlations than did the boys.

TABLE II

COEFFICIENTS OF CORRELATION BETWEEN THREE HEIGHT-GIRTH RATIOS AND TWO METHODS OF SOMATOTYPING

Ratio	*Sex*	*Number of Children*	*Coefficient of Correlation (r) between Height/Girth Ratio and Subjective Method of Somatotyping*	*Coefficient of Correlation (r) between Height/Girth Ratio and Wetzel Grid Method of Somatotyping*
Height/Calf Girth	M	304	+ .646	+ .812
	F	227	+ .677	+ .825
Height/Chest Circumference (average)	M	304	+ .606	+ .844
	F	227	+ .499	+ .661
Height/Neck Circumference	M	302	+ .367	+ .620
	F	227	+ .175	+ .456

Neck girth showed the lowest correlation with body build. However, a certain degree of correlation did exist (see Table II). This indicated that neck girth varied somewhat with body build as well as with age.

Chest circumference in boys was as highly correlated with body build as was calf girth. Chest circumference in girls, on the other hand, was less highly correlated with body build. Chest circumference of girls thus behaved like neck girth, whereas the chest girth of boys followed the calf girth closely.

The consistently greater correlations of these height-girth ratios with the objective Wetzel method of channelization over the subjective method of somatotyping incated that in spite of some limitations, the objective method is more accurate than the subjective method of somatotyping a child.

There is evidence that the height to calf girth ratio is even more accurate an objective method of somatotyping than is the Wetzel grid method since the height-calf girth relationship remains constant regardless of age. The intercorrelations suggested that the height-calf girth ratio may be the best indicator of somatotype, with the Wetzel's grid method closely following and the subjective method (as we have used it) least certain. This last might well be the result of the liberties taken in grouping the children into only seven categories.

The *inherent* somatotype is revealed by the height-calf girth ratio whereas the Wetzel grid method which is dependent on the actual weight of the child indicates the *present* body build of the child. For example, a stocky child may have become obese through overeating. The Wetzel Grid would indicate the present obesity while the calf girth would reveal the inherent stockiness.

The following ranges of values of the height-calf girth ratio may serve as a guide to an objective method of somatotyping of children:

Height/Calf Girth:

4.45 and lower — Extremely stocky or obese (extreme endomorphy)
4.46 to 4.65 — Stocky (endomorphy)
4.66 to 4.85 — Moderately stocky (moderate endomorphy)
4.86 to 5.05 — Average build (mesomorphy)
5.06 to 5.25 — Moderately slender (moderate ectomorphy)
5.26 to 5.45 — Slender (ectomorphy)
5.46 and higher — Extremely slender or thin (extreme ectomorphy)

A graph based on the above values was constructed to illustrate this objective method of somatotyping children (Figure 2).

Prediction of Normal Weight from the Empirical Formula:

$$\frac{(\text{Circumference})^2}{K} \times \text{Height} = \text{Weight}$$

Since body weight (volume) is a function of the height, width, and depth of the body, the calculation of body weight may be said to be a function of height multiplied by a circumference of the body. The formu-

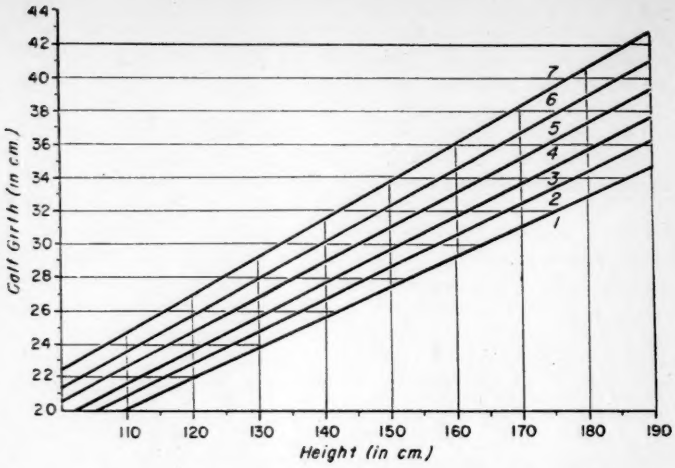

FIGURE 2—Diagram of an objective method of somatotyping children based on the height/calf girth relationship.

Channel 1 — extremely slender
Channel 2 — slender
Channel 3 — moderately slender
Channel 4 — average build
Channel 5 — moderately stocky
Channel 6 — stocky
Channel 7 — obese

la offered above was derived by Massler (7) on the basis that the human body may be represented by an irregular cylinder whose specific gravity, under ideal conditions of tissue balance, approximates 1.0 .The weight of this cylinder could be calculated by multiplying its height by the square of its "average" circumference divided by "pi" and a correction factor (K) for the irregularity of the cylinder. Body weight may, on this basis, be considered to vary only with body contour. A girth which varied only with body type and not with age would make an ideal indicator of weight.

The high correlation of the height-calf girth ratio with the somatotype suggested the use of this girth in the calculation of "normal" body weight in addition to or instead of the chest circumference as indicated by Massler (7). The K factors in the weight formula given above were, therefore, calculated for each child using chest, neck, and calf circumference. Table III shows the statistical analysis of these computations.

This analysis showed that the K factor is a very reliable figure for each of the circumferences tested. The odds are greater than 99 to 1 that in re-

peated samples the means would occur within the limits stated in the last column of Table III. For example, great reliance can be placed upon the probability that, in future samples, the mean of the constant in the formula using leg girth for boys will fall within the range of 3.247 ± 0.0324.

TABLE III

MEANS AND OTHER STATISTICS IN THE DERIVATION OF THE CONSTANT* IN THE WEIGHT FORMULA USING CALF, CHEST, AND NECK CIRCUMFERENCES

Circumference	*Sex*	*Number of Children*	*Mean of (K)**	*Total Range of (K)**	*Standard Deviation*	*Standard Error of the Mean*	*Deviation of the Mean at Odds 99 to 1*
Calf	M	304	3.247	±0.70	.2217	.0125	±.0324
	F	227	3.334	±0.75	.2503	.0160	±.0416
Chest (at average resp.) ...	M	304	1.706	±0.26	.0890	.0050	±.0130
	F	227	1.545	±0.35	.1196	.0076	±.0197
Neck	M	302	3.489	±0.90	.2826	.0160	±.0415
	F	227	3.143	±1.05	.3420	.0220	±.0572

* $K = \frac{(\text{Circumference})^2}{\text{Weight}} \times \text{Height}$

On the basis of these findings the calculated means can now be substituted into the formula in order to derive a "normal" weight. As an example, the formula for the calculation of weight using calf girth would read:

$$\frac{(\text{Calf Girth})^2}{3.247} \times \text{Height} = \text{Weight (Boys)}$$

$$\frac{(\text{Calf Girth})^2}{3.334} \times \text{Height} = \text{Weight (Girls)}$$

(Height and girth measurements are recorded in centimeters; weight in kilograms.)

Similar substitutions can be made in the formulae using chest and neck circumferences by inserting the appropriate constants listed in Table III. However, a correction factor for age would have to be used with the chest and neck constants since, as has been shown in the previous section, these height-girth ratios vary with age. No such correction is necessary when using the calf girth since the height-calf girth ratio has been shown to remain constant within the age limits used in this study.

Reliability of Prediction Formulae

The reliability of the formula for the calculation of weight could be determined by comparing the actual weight of the children with that predicted by the formula. Since this group of Mooseheart children may be considered to approach a physically superior group, the calculated weight should be expected to approach the actual weight very closely.

Both the chest circumference and calf girth were used to obtain predicted weights (Table III). The correlations (r) are summarized in Table IV.

TABLE IV

CORRELATION COEFFICIENTS OF ACTUAL AND PREDICTED WEIGHT USING MEASUREMENTS OF CALF AND CHEST CIRCUMFERENCES

Prediction Formula	*Sex*	*Number of Children**	*Coefficient of Correlation (r) between Actual and Predicted Weight*
$\frac{(\text{Calf Girth})^2}{K} \times \text{Height}$	M	285	+ .9902
	F	227	+ .99994
$\frac{(\text{Chest Circumference})^2}{K} \times \text{Height}$ ..	M	285	+ .8978
	F	227	+ .9922

* Nineteen boys omitted here because of erroneous data.

The coefficient of correlation using chest circumference is even higher than that reported by Massler (7), probably because instead of a single constant as used by Massler, different constants were used in the formulae for boys and girls. Also, a much narrower age range was tested, five to seventeen years, instead of birth to fifty years.

As for the calf girth, the extremely high correlation of +.9902 for boys and +.99994 for girls was even more remarkable. This indicated fairly conclusively that, in normal children between the ages of 5½ to 17½ years, calf girth was an excellent indicator of weight.

Sex Differences

The numerical values for the constants in the formula are the means derived for each sex by substituting the measured height, calf girth and weight in the formula and solving for K. Statistical analysis (see Table V) showed that there was a significantly greater reliability in predicting weight if *different* values of the constant "K" were used for each sex. This eliminated the possibilty of combining the sexes and using a single constant

as was done by Massler (7). The increased accuracy in predicting weight justified this procedure. The probability that the difference between the constants for boys and girls did not occur by chance was better than 99 to 1 (Table V).

TABLE V

COMPARISON OF THE VALUE "*K*" IN BOYS AND GIRLS
(Derived from the Weight Formula Using Calf Girth)

Statistic	*Girls*	*Boys*
Number of Children	227	304
Value of "*K*" — Range	2.2745—4.244	2.563—3.962
Value of "*K*" — Mean	3.334	3.247
Standard Deviation	.250	.222
Standard Error of the Mean	.016	.013
Difference of the Means	.0867	
Standard Error of the Difference of the Means	.0203	
Student's *t*	4.27	

Ease of Clinical Procedures

In the clinical application of the three girth measurements, the chest circumference was found to be the most difficult to measure accurately because of respiratory movements and the depositions of subcutaneous adipose tissue near the area measured. A serious defect in the clinical use of this measurement appeared when it was taken over clothes, as in older girls. Of the three circumferences tested, the calf girth was found to be the simplest and easiest to obtain and least susceptible to errors in measurement. It should be noted that an error in the measurement of the calf girth is likely to be more significant than an error in the chest circumference measurement because of the smaller dimensions of the calf girth. While the neck girth was also simple to obtain, it could not be used because of the marked changes in proportion to height as the child increased in age.

Nomograms for the Calculation of "Normal" Weight

In order to eliminate the necessity for tedious calculations, two nomograms[3] were devised for the calculation of "normal" weight in children, using height and calf girth. These nomograms (Figures 3 and 4) show the

[3] The construction of these nomograms was done by Mr. S. H. Pierce, of the College of Engineering, University of Illinois, Urbana, Illinois.

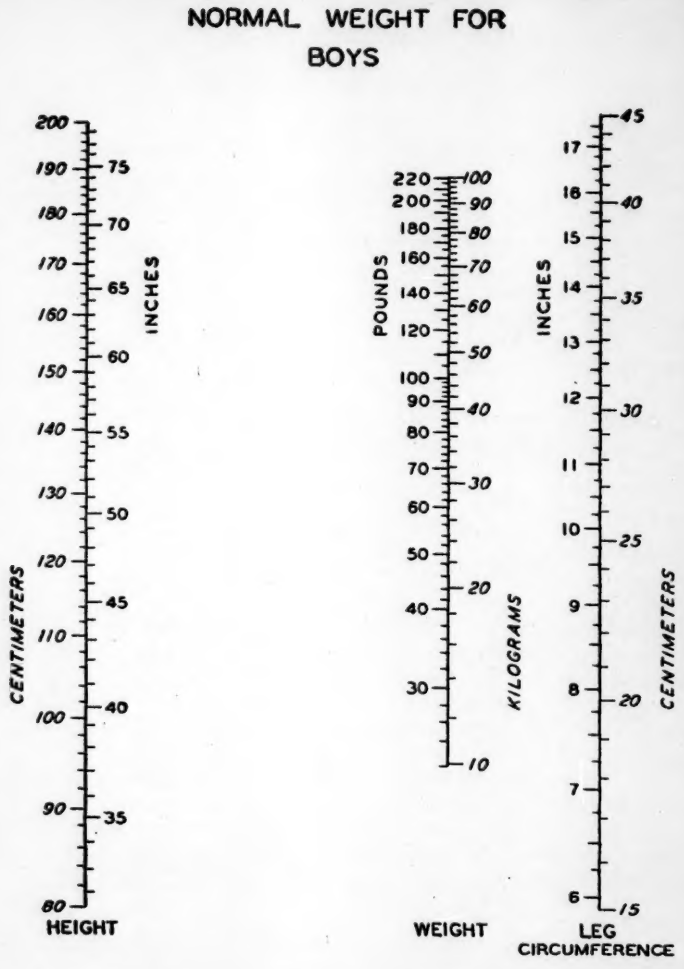

FIGURE 3—Nomogram for the calculation of "normal" weight for boys aged five to eighteen years, using calf girth.

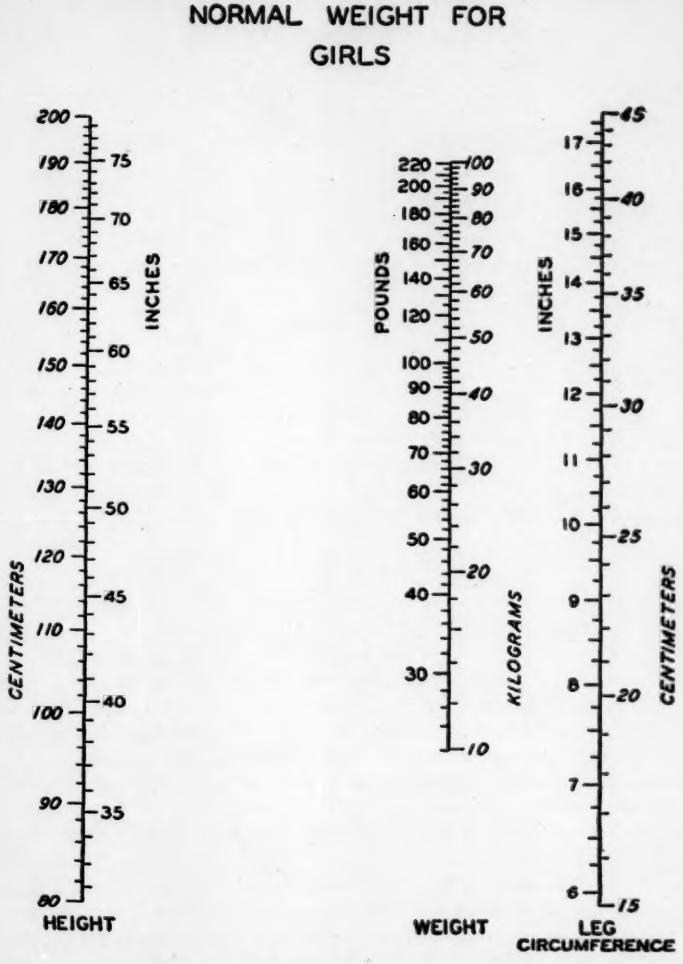

FIGURE 4—Nomogram for the calculation of "normal" weight for girls aged five to eighteen years, using calf girth.

mathematical relationship between the three variables, as presented in the weight calculation formulae:

$$\frac{(\text{Calf Girth})^2}{3.247} \times \text{Height} = \text{Weight (Boys)}$$

$$\frac{(\text{Calf Girth})^2}{3.334} \times \text{Height} = \text{Weight (Girls)}$$

The proper points on the lines labelled height and calf circumference are marked and connected with a straight edge. The calculated weight is read directly from the scale in pounds or kilograms.

Discussion

Many attempts have been made to calculate "normal" weight on the basis of anthropometric measurements. Some are very accurate in their prediction of "normal" weight, but also quite complex—too complex for the use of the private practitioner. Others have attempted to simplify the procedure without too great a sacrifice of accuracy. This study had for its primary objective the derivation of a method of determining "normal" weight which would be both simple and accurate.

Selection of Measurements

Several factors must be borne in mind in the selection of proper anthropometric measurements for routine use in office or clinic:

a) They must be as few in number and as easy to obtain as possible. Experience has shown that strict scientific accuracy and completeness must sometimes be sacrificed for the sake of simplicity and practicability. It is well known that teachers, nurses, physicians and particularly dentists will not make use of complicated standards even though their accuracy may be quite superior. They are much more likely to use standards that can be referred to quickly and easily and whose results can be quickly interpreted from tables. These practical factors have been kept foremost during this study.

b) The smallest possible error in obtaining these measurements is a very important factor in their selection. It is obvious that unless the child can be almost completely undressed for the examination, the errors of chest and hip girth measurements are measurably increased. For this reason, both neck and calf circumferences were tested in an attempt to find a girth both clinically feasible and least subject to error of measurement.

c) The measurements selected must be those which, logically and mathematically, are best suited to judge the normal development of the individual.

Through long experience, it has been established that *stature*, of all skeletal measurements, best represents gross linear size and rate of linear growth (25).

Body weight was included because it alone sums up the entire mass of the body.

Chest circumference has long been recognized as an important measure of the character of the bony skeleton and thus the body build of the patient. McCloy, in his analysis of children, found that the circumference measurement was better than the best combination of depth and breadth of chest, and "as far as predicting normal weight is concerned, the circumference of the chest measured at the Xiphoid level is the best" (8, p. 54). Massler (7) also found that this measurement at the Xiphoid level was best because it was little influenced by fat depots, was not influenced by secondary sex characteristics in the female, and was the most exact of all circumferential measurements in the calculation of the mean circumference of the body.

The size of the musculature and its important contribution to body weight make necessary the consideration of this factor in all predictions of body weight. Although musculature alone can be measured independently only by roentgenograms, certain circumferences of the body are directly influenced by amount of the subjacent muscle mass (calf girth) just as others are directly influenced by the amount of subcutaneous adipose tissue (abdominal girth). Both neck and calf circumferences were considered in this study in order to determine their influence upon the calculation of body weight. Neck girth was found to be greatly influenced by subcutaneous tissue and by age and therefore not useful in the calculation of weight. Calf girth varied directly only with weight (height being held constant). Calf girth apparently reflects only the amount of bone and muscle mass since the amount of subcutaneous adipose tissue is, in proportion to the muscle mass, relatively small in this area. This is true even in obese persons. The predictive value of calf girth in determining "normal" weight in obese persons should be very high. Such studies are now in progress.

There has been no intent to imply that other anthropometric measurements are not advantageous or useful. Additional measurements undoubtedly increase the "description" of an individual. The problem of selection has, however, been considered as important, and it is felt that the measurements selected in this study, i.e., height, calf girth and weight, are simple, accurate and easily adaptable to the practitioner's needs.

Somatotyping. The problem of objectively determining the body build or somatotype of a given child is not simple. A knowledge of the inherent growth pattern and eventual body build of the child is important in the prognosis of growth. At the present time, the practitioner must take recourse to either an examination of parents and siblings from whose body build he may *estimate* the eventual somatotype of the child or a long range longitudinal study of the child. This is not often possible.

Figure 2 is a diagram which shows, by using channels, an objective method of somatotyping children based on the height-calf girth relationship. This method has the advantage over Wetzel's method which uses the height-weight relationship in that the inherent or "normal" channel of the child in indicated rather than the present channel as indicated by the Wetzel Grid. It is obvious that a combination of both methods would be of practical clinical value, one assessing the child's present status and the other his "ideal" or "normal" channel or body type.

Summary and Conclusions

1. Selected anthropometric measurements were taken on a group of 538 midwestern children (aged 5½ to 17½ years) in maximal health and good nutritional status. These were analyzed in order to discover a simplified but accurate method for calculating the "normal" weight of an individual.

2. *Neck girth* was tested as an indicator of body weight. It was found that neck girth varied with both body build and the age of the individual. This measurement is, therefore, too complicated to use in any prediction formula.

3. *Chest circumference at the Xiphoid level* was measured, and this girth was found to be a very reliable index of weight when combined with height. This substantiated previous findings by Massler (7).

4. *Calf girth* was found to bear a specific and very close relationship to body weight, regardless of age. This measurement was found to be directly and closely related to the body build (somatotype) of the individual. It has advantages over the chest circumference measurement (which is also closely related to body build) in that it is easy to obtain and subject to only small errors in measurement.

5. *Calf girth and height* were used in the prediction formula as suggested by Massler (7), and constants were derived for boys and girls. The correlation coefficients between the actual and predicted weights (to within one kilogram) were then calculated and found to be +.9902 for boys and +.99994 for girls.

6. *A channel diagram* similar to the Wetzel Grid is presented for the determination of body type in children on the basis of the constant relationship between height and calf girth at all ages examined. This method of channelization has the advantage of indicating the *inherent* or "normal" body build of the child rather than the present status as indicated by the Wetzel Grid.

7. Two *nomograms* based on the measurement of calf girth and height are presented for the calculation of "normal" or "ideal" weight of chil-

dren ages 5½ to 17½ years. These measurements are easy to obtain in the clinic, office or school, and sufficiently accurate in their predictive value of "ideal" weight to make them useful to the practitioner.

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A STUDY OF THE RELATIONSHIP BETWEEN READING READINESS IN GRADE ONE SCHOOL CHILDREN AND PATTERNS OF PARENT-CHILD INTERACTION

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HYPOTHESES

That innate differences contribute to differing degrees of verbal skill found in individuals, as measured by appropriate standardized tests, is generally accepted. That innate and learned factors in behavior are so intertwined, almost from before birth, as to make it difficult, if not impossible, to separate out the relative influence of each factor, is coming more and more to be recognized. Nevertheless, in the writer's opinion, it continues to be fruitful to attempt to identify what particular innate or environmental factors may be operative in any particular area of behavior.

It was her close contact with the early childhood family verbal environments of a number of middleclass children of her acquaintance, as well as her initiation into the researches of Allison Davis, and Robert J. Havighurst and others on some of the characteristics of the environment of the lower-class child, which led her to the three hypotheses which she attempted to test in this study:[1]

1. that the extent of reading ability in Grade I children is related to certain ascertainable patterns of parent-child interaction in the family setting.
2. that those patterns of parent-child interaction found to be associated with high or with low reading ability are correspondingly related to higher and lower family social status.
3. that high reading ability in Grade I children is related to "higher" family social status; and conversely, that low reading ability in Grade I children is related to "lower" family social status.

Children in the first grade in school were specifically included in the hypothesis on the assumption that school-based verbal influences have not, at this stage of a child's experience, had much of a "chance" to influence the verbal skills of a child, and conversely, that family verbal influences are greater at this point in the child's school history.

[1] Sponsored by the Carnegie Foundation for the Advancement of Teaching, experimental program of grants-in-aid for college professors.

Procedure

Data to test these three hypotheses were obtained in the following ways:

(1) All the children in one Grade I class in each of three elementary schools in a large southern city[2] were given the following group tests: the Haggerty Reading Examination, Sigma I, and subtest I plus the "language factors" subtests of the California Test of Mental Maturity, Primary Form, 1947 edition (tested in groups of five). Three of these children were eliminated as being markedly retarded or accelerated,[3] leaving a "test group" of 108. About 25 in School "B," and 5 in School "A" were also given the Gray Oral Reading Paragraphs, an individual test, on an exploratory basis.

The three schools used were selected so as to allow for a broad social class representation among the subjects tested. School "A" is a private school attended almost entirely by the children of faculty members and employees of the city's Negro institutions of higher learning and of professional and business men of the Negro community. The entire Grade I class of 26 children of this school was included in the test group as most likely to insure an upper-middle (UM) and lower-middle (LM) social class representation.[4] School "B" is a public school, described by the city's Board of Education and its principal as attended chiefly by the children of "middle income" and status families, with a few children from the "upper levels" and from the "very low levels" also in attendance. One Grade I class (ungrouped) from this school (45 children) was included as most likely to insure upper-lower (UL) and lower-middle class representation in the group of children to be tested. School "C" is a public school situated in one of the "blighted" housing areas of the city, has a large housing project nearby, and is described by the Board of Education and its principal as attended almost entirely by the children of the "lower income" and status levels, ranging from the "lowest" to the more stable and "respectable working class" group. One Grade I class (ungrouped), from this school (40 children), was included as most likely to insure lower-lower (LL) and upper-lower class representation in the test group.

On the basis of the results from the Haggerty and the exploratory Gray Oral Reading Paragraphs, it became clear that as a group these children did not have a level of reading ability measurable by these tests. Since a complete range of "language I.Q." scores was obtained on the California Test of Mental Maturity, and since the relevant

[2] Atlanta, Ga.

[3] Only those children ranging in age from 6-0 to 7-11 at the time of testing, April, 1950, were retained.

[4] As defined by W. L. Warner's Index of Status Characteristics (2).

subtests taken together closely approximate tests of reading readiness, the "language I.Q." score obtained on this test became the basis of the selection criterion. The 21 children obtaining the highest language factors scores were selected as being the "high scorers" and the 21 children obtaining the lowest language factors scores were selected as being the "low scorers"—these 42 children together constituted the "Study Group."

Table I gives the distribution by percentile scores on language factors of the test group; Table II gives the distribution of the Study Group according to schools.

TABLE I

DISTRIBUTION OF PERCENTILE SCORES ON "LANGUAGE FACTORS" OF TEST GROUP ($N = 108$)

Percentile	1	5	10	20	30	40	50	60	70	80	90	95	99
No. of Children	11	29	18	11	9	4	4	7	2	7	1	3	2

TABLE II

DISTRIBUTION OF THE STUDY GROUP ACCORDING TO SCHOOLS

Grade I Class from:	*Number of High Scorers*	*Number of Low Scorers*
School "A"	16	1
School "B"	5	8
School "C"	0	12

Note in Table I the marked clustering of scores at the lower end of the distribution—69 of the 108 children scored at the 20th per cent or below. Table II clearly shows that high-scoring and low-scoring were associated with particular schools.

(2) Each of the 42 children of the Study Group were interviewed individually and privately in their respective school settings by the writer according to Interview Schedule II. This schedule consisted of the following 13 questions:

1. If you had three wishes, what would they be?
2. Does your mother do things that make you like her very much? What things?
3. What makes you mad when you're at home sometimes? Anything or anyone else?
4. What things does your daddy do that make you cry or feel real bad?

5. What do you wish you could do if you only could?
6. Does your father do things that make you like him very much? What things?
7. What would you do if you had all the money you wanted?
8. What things does your mother do that make you cry or feel real bad?
9. Do you ever feel real happy? When do you feel happy—what makes you feel happy?
10. Do you ever feel real sad? When do you feel sad—what makes you feel sad?
11. Who would you like to be like when you grow up?
12. What would you like to be—what kind of work would you like to do—when you grow up?
13. Do you have any books of your own? How many? Who reads them to you? When, usually?

Ample time was allowed for all answers; if there was any hesitation or expression of bewilderment, the question was rephrased until some response was obtained.[5]

(3) A corps of six graduate student interviewers were prepared for the task of parent interviewing. They made use of Interview Schedule I chiefly at a parent orientation meeting ("We are trying to find out about the kinds of things parents and children do together") to which parents of the Study Group were invited by letter. The purpose of this schedule was to obtain information necessary for social-class typing according to a modified form of Warner's I.S.C. formulation[6] and to determine the most convenient times for home interviews. This schedule was given in the home to those parents who were unable to attend this meeting. Responses to Schedule I were obtained from 33 of the 42 "sets" of parents or parent-surrogates.

(4) Responses of 30 mothers[7] were obtained to Interview Schedule III as a result of home interviewing. Schedule III was designed to get information on the usual home routines and on child-training practices in general, as well as on the mother herself.

(5) Responses of 23 mothers were obtained to Interview Schedule IV as a result of home interviewing. Schedule IV was a daily activity record; the same questions concerning what had happened the pre-

[5] Particular attention was paid to the problem of rapport. The children assured their teachers they had enjoyed the "games" they had "played" with the writer and appeared to her to enjoy the interview situation also. The difference in skin color did not seem to be a barrier to rapport with any of the children.

[6] Occupation, source of income, education of the family breadwinner were the indices used, with respective weights of 5, 4, and 3.

[7] Or the person taking the role of mother.

vious day were asked each day for three successive days. The "concensus" response to each question was used—that is, the answer given two out of three, or all three times. A separate tally-category was provided to cover those answers which differed each day.

Schedules III and IV were constructed somewhat along the line of the "buckshot principle"—a wide variety of questions were asked in the hope that those which might prove significant had been included. The "loss" in mothers from 42 to 33 to 30 to 23 was due primarily to a lack of consistent follow-through on the part of some of the interviewers rather than to a lack of parental cooperation. The majority of those mothers who proved to be LL class were interviewed by a young woman who had had extensive contact with this population group in her role as neighborhood grocery store operator and general "confidante," with every indication that rapport was excellent.

The responses to each of the questions of each of the interview schedules were tallied, categorized, and retallied according to whether (*a*) the child responding was a high scorer or a low scorer, or (*b*) the mother responding was the mother of a high scorer or of a low scorer. The results of Schedule IV were in addition tallied according to two social-class groupings: lower and middle. It was assumed that no difference in responses existed between the low scorers and the high scorers as well as between the responses of the mothers of the low scorers and the mothers of the high scorers. This null hypothesis was systematically tested for every set of responses through application of the *chi-square* technique.[8]

It was found that at least one answer to certain of the questions in each interview schedule showed a significant difference (at the .001, .01, .02, and .05 levels) between the two groups of respondents. Such responses have been termed "discriminating" and are presented in the next section.

Results

Table III gives the social class distribution of the 16 low scorers' families and the 17 high scorers' families. The actual relationship between the family's I.S.C. ratings and the child's "language I.Q." was correlated, yielding a Pearson *r* of .86, and a *rho* of .784.

Table IV gives those questions in Interview Schedule II which were found to yield at least one discriminating answer, the entire range of answers to the question including the discriminating response, and the level

[8] D. J. Finney's tables in *Biometrika*, and the Fisher-Yates formula were utilized where *N* was 50 or less and the uncorrected *chi-square* formula for use with 2 × 2 contingency tables was used where *N* was over 50.

TABLE III

SOCIAL-CLASS DISTRIBUTION OF LOW SCORERS AND HIGH SCORERS FOR WHOM ISC SCORES WERE OBTAINED ($N = 33$)

Social Class		High Scorers		Low Scorers	
Status	*ISC Rating*	*No.*	*%*	*No.*	*%*
LU	12–23	1	5.88	0	0
UM	24–35	8	47.06	0	0
LM	36–51	7	41.18	1	6.25
UL	52–64	1	5.88	4	25.00
LL	65–84	0	0	11	68.75
TOTALS		17	100.00	16	100.00

of significance of the difference between the number of low scorers and of high scorers giving the discriminating response.

Judging from the indicated differences in these children's responses, the high scorers, significantly more frequently than the low scorers,

1. wish for toys and things to play with and/or a pet;
2. express appreciation for the time their mother spent in taking them places and in reading to them;
3. express strongly negative feelings about parental control and prohibition of their behavior and desires;
4. indicate that they possess several or a great many story books;
5. indicate they are habitually read to by their mothers and/or fathers.

Similarly, the low scorers significantly more frequently than the high scorers,

1. either cannot think of a wish to make or can express only one;
2. express strong negative feeling about physical punishment administered to them by their parents;
3. either cannot recall ever feeling "real happy" or are unable to describe or recall instances or situations when they felt happy;
4. indicate that they possess only funny books and/or school books.

Further attempts to analyze or to interpret the above findings are postponed until the results of the other instruments are presented.

Table V gives those questions in Interview Schedule III which were found to yield at least one discriminating answer, the entire range of answers to the question, including the discriminating response(s), and the level of significance of the difference between the number of low scorers' mothers and high scorers' mothers giving the discriminating response.

TABLE IV

CATEGORIZED RESPONSES OF THE STUDY GROUP TO DISCRIMINATING QUESTIONS OF INTERVIEW SCHEDULE II ($N = 42$)

Responses	Number of *Low Scorers*	Number of *High Scorers*	*Value of Chi-Square Significant at*
1. *If you had three wishes, what would they be?*			
(1) Don't know or only one response*	9	2	.02 level
(2) Toys and things to play with and/or a live pet*	10	19	.05 level
(3) Things for the home	2	3	
(4) Book, typewriter, pen	2	2	
(5) Article of clothing	4	2	
(6) A car	2	1	
(7) Money	1	1	
(8) Someone to play with	2	0	
(9) Pertaining to a friend or relative	1	3	
(10) Single response (misc.)	2	3	
TOTAL	35	36	
2. *Does your mother do things that make you like her very much? What things?*			
(1) She buys or gives me things that I like or want (clothes, possessions, goodies)	10	12	
(2) She looks after me (cooks for me, feeds me, keeps me clean, sews for me, makes me do what I should do)	9	7	
(3) She lets me do things I want to do	3	3	
(4) She does nice things (or things I like) for me	2	2	
(5) She takes me places with her and/or reads to me*	0	8	.01 level
(6) No, or I don't know	2	0	
TOTAL	26	32	
3. *What makes you mad when you're at home, sometimes?*			
(1) When my mother or father or older sib whips me	4	1	
(2) When a brother or sister fights or argues with me	3	6	
(3) When my parents or other adults won't do what I want them to do	2	1	
(4) When my parents won't let me have or do what I want to have or to do*	1	7	.01 level
(5) When my parents make me do what I don't want to do	2	1	
(6) When other children fight with me	6	4	
(7) Single responses (misc.)	1	2	
(8) No, or nothing	4	0	
TOTAL	23	22	
4. *What things does your father do that make you cry or feel real bad?*			
(1) He punishes me (*a*) whips me*	11	1	.01 level
(*b*) whips or spanks me when I have been bad	3	3	
(*c*) hollers at me	1	2	

TABLE IV (continued)

Responses	Number of Low Scorers	Number of High Scorers	Value of Chi-Square Significant at
(2) He won't do or give me things I want him to do or to give me, and/or he makes me do things I don't want to do, or won't let me do things I want to do*	4	13	.01 level
(3) He does things I don't like	1	1	
(4) (No father-figure in the home)	1	1	
(5) No, or nothing	3	4	
TOTAL	24	25	
8. *What things does your mother do that make you cry or feel real bad?*			
(1) She punishes me (*a*) whips me, beats me, slaps me*	11	0	.01 level
(*b*) fusses or yells at me	1	1	
(*c*) whips me when I've been bad	3	4	
(2) She won't do or give me things I want her to do or to give me; she makes me do things I don't want to do or won't let me do what I want to do*	5	13	.01 level
(3) She spanks my little brother	0	1	
(4) Nothing	3	5	
TOTAL	23	24	
9. *Do you ever feel real happy? When do you feel happy?*			
(1) When a parent lets me do what I want to do	0	3	
(2) When a parent does something for me that I like	0	2	
(3) When I'm doing something I like to do	7	7	
(4) When I get or have things I want or like; on special days (birthday, Christmas, Easter)	5	6	
(5) Single responses (misc.)	3	3	
(6) Yes—I don't know; no*	6	0	.01 level
TOTAL	21	21	
12. *Do you have any books of your own? What kind?*			
(1) No	6	1	
(2) Yes—funny books only; school books only*	9	0	.01 level
(3) Yes—1 or 2 or 3 story books	6	5	
(4) Yes—several or a great many story books*	0	15	.001 level
TOTAL	21	21	
13. *Does anyone read them to you? Who?*			
(1) Mother and/or father*	5	17	.001 level
(2) Other adult relative	2	2	
(3) Older sib or relative	5	1	
(4) Nobody; just myself	3	0	
(5) No books	6	1	
TOTAL	21	21	

* Discriminating (between low scorers and high scorers) responses.

TABLE V

CATEGORIZED RESPONSES OF 30 MOTHERS OF THE STUDY GROUP TO DISCRIMINATING QUESTIONS OF INTERVIEW SCHEDULE III •

Responses	Number of Mothers of *Low Scorers*	*High Scorers*	*Value of Chi-Square Significant at*
7. *Do you sometimes use baby-sitters for (child)? Who?*			
(1) Yes, adult relatives or friends	4	10	.05 level
(2) No	11	5	.05 level
TOTAL	15	15	
9. (*a*) *What time do you usually get up?*			
(1) 6:00 or earlier	9	1	.01 level
(2) Later than 6:00	1	13	.01 level
(3) No answer	5	1	
TOTAL	15	15	
9. (*b*) *What time do you usually go to bed?*			
(1) 10:00 or later	4	13	.01 level
(2) Earlier than 10:00	8	0	.01 level
(3) ?	3	2	
TOTAL	15	15	
13. (*b*) *When does (child) usually eat dinner or lunch?*			
(1) 12:30 or earlier	5	12	.05 level
(2) Later than 12:30	8	3	
(3) No answer	2	0	
TOTAL	15	15	
20. *What jobs around the house and yard do you expect (child) to do each day?*			
(1) Take care of his own possessions and/or room	1	9	.01 level
(2) Family—home chores	9	8	
(3) Nothing	5	3	
TOTAL	15	20	
37. (If yes to 36) *What kinds of bribes do you offer (child)?*			
(1) Give child money (nickel or a dime)	7	0	.05 level
(2) Give or buy child something wanted or liked	5	3	
(3) Take on, or allow to do, a preferred activity	1	4	
(4) Single response (misc.)	1	0	
TOTAL	14	7	
40. (1) *What is your present occupation?*			
(1) Housewife only	13	6	.05 level
(2) Teacher	0	3	
(3) Secretary	0	0 2	7 .001 level
(4) Assist in husband's business	0	1	
(5) Owner of taxi	0	1	
(6) Maid	0	1	
(7) No answer	0	2	
TOTAL	13	16	

TABLE V (continued)

Responses	Number of Mothers of *Low Scorers*		Number of Mothers of *High Scorers*		*Value of Chi-Square Significant at*
40. (2) *What was your occupation before your marriage?*					
(1) Student	2		7		
(2) Domestic servant	4		0		
(3) Waitress	2	11	0	0	.001 level
(4) Cafe cook; sandwich maker	2		0		
(5) Janitress; laundry work	3		0		
(6) Teacher	0		5		
(7) Social worker	0		1		
(8) No answer	0		2		
TOTAL	13		15		
6. (from Schedule I) *Last grade mother completed?*					
(1) No further than 7th grade	7	12	1	1	.001 level
(2) No further than 11th grade	5		0		
(3) Completed high school	4		3		
(4) 2–4 years of college	0	0	8	10	.001 level
(5) M.A. degree	0		2		
TOTAL	16		14		

* Those questions to which at least one answer proved to discriminate between mothers of the low scorers and the high scorers.

To recapitulate from Table V, significantly more of the mothers of the high scorers than the mothers of the low scorers indicated that

1. they occasionally make use of a baby sitter;
2. they usually get up later than 6:00;
3. they usually go to bed at 10:00 or later;
4. they serve the children their midday meal at 12:30 or earlier;
5. they expect the children to look after their own possessions and/or their own room as a regular household responsibility;
6. they are mainly in a professional or a responsible clerical occupation in addition to their home-based functions;
7. they were teachers before marriage;
8. their education ranges from two years of college to the M.A. degree.

Conversely, significantly more of the mothers of the low scorers than mothers of the high scorers indicated that

1. they do not use baby sitters;
2. they arise at 6:00 or earlier;

3. they go to bed earlier than 10:00 p.m.;
4. if they employ bribes as a child training technique they give small amounts of money as the most frequent bribe;
5. their current occupation is that of housewife only;
6. their occupations before marriage were all of a service nature;
7. they went no further than the eleventh grade in school.

Further attempts to analyze or interpret the above findings are postponed until the results of the remaining instruments are presented.

Table VI gives those questions in Interview Schedule IV which were found to yield at least one discriminating answer, the entire range of answers to the question, including the discriminating response(s), and the level of the significance of the difference between the number of low scorers' mothers and high scorers' mothers giving the discriminating response.

The mothers of the low scorers indicated, significantly more frequently than the mothers of the high scorers, that during the course of apparently most days

1. they do not eat breakfast together with the children;
2. they do not talk with the children during breakfast *or* they only give direct orders, cautions and instructions to them in a one-way communication fashion;
3. the children do not talk with anyone between the time they finish breakfast and the time they leave for the school;
4. no one has any conversation with the children while they are eating their supper;
5. neither they nor any other related adult hug, or kiss, or speak approvingly to their children.

The mothers of the high scorers indicated, significantly more frequently than the mothers of the low scorers, that during the course of apparently most days

1. they have breakfast together with their children;
2. they have a two-way conversation with the children during breakfast and/or they permit them to prattle away;
3. the entire family (father, mother, brothers, sisters, etc.) have breakfast together;
4. there is general conversation among family members at the breakfast table;
5. the children participate in the conversation at the supper table;
6. they or another related adult (e.g. father, grandmother) hug, or kiss, or speak approvingly to their children.

TABLE VI

CATEGORIZED RESPONSES OF 23 MOTHERS OF THE STUDY GROUP TO DISCRIMINATING QUESTIONS OF INTERVIEW SCHEDULE IV *

Responses	Number of Mothers of *Low Scorers*		*High Scorers*		*Value of Chi-Square Significant at*
10. *Did you eat breakfast with (child)?*					
(1) No	9		2		.01 level
(2) Yes	2		10		.01 level
TOTAL	11		12		
11. *Did you say anything to each other during breakfast? What?*					
(1) No	7	8	2	2	.05 level
(2) Mother giving orders or instructions to child	1		0		
(3) Conversation and/or only child talking	3		10		.05 level
12. *Who else ate breakfast with (child)?*					
(1) No one	5	11	2	4	.01 level
(2) Sib(s)	6		2		
(3) Whole family (including parents)	0		7		.01 level
(4) ?	0		1		
TOTAL	11		12		
13. *Did they talk to each other during the meal? What about?*					
(1) No answer	5		2		
(2) No	3		1		
(3) Yes—conversation	3		9		.05 level
TOTAL	11		12		
16. *Did (child) talk to anyone between breakfast and leaving for school? Who?*					
(1) Yes—to mother or father, conversation	5		8		
(2) No	5		0		.05 level
(3) Yes, to baby	1		0		
(4) (School no longer in session, at time of interview)	0		4		
TOTAL	11		12		
34. *Did anyone talk to (child) while he-she was eating her supper?*					
(1) Yes—child participating	5		11		.05 level
(2) No	6		1		.05 level
TOTAL	11		12		
46. *Did you or anyone else hug, kiss or speak approvingly to (child) yesterday?*					
(1) No	9		1		.01 level
(2) Yes	2		11		.01 level
TOTAL	11		12		

* Those questions to which at least one answer proved to discriminate between mothers of the low scorers and the high scorers.

It should be noted that the number of discriminating responses of the mothers of the low scorers was found to be the same as the number of discriminating responses of the mothers of lower-class status, with a similar convergence of the number of discriminating responses for the mothers of the high scorers and the mothers of middle-class status. That is, the findings listed above may be restated, substituting for the words *mothers of low scorers and mothers of high scorers,* the words *lower-class mothers and middle-class mothers,* respectively.

Analysis of Findings: Conclusions

Since a high relationship was found between low scoring and lower-class status and high scoring and middle-class status, the question that comes at once to mind is: to what extent are all other findings a function of social-class status rather than of low reading-readiness and high reading-readiness per se?

The problem in analyzing the findings of this study, accordingly then, seems to be whether it is (*a*) possible, and (*b*) necessary to separate social class as an independent variable from the many concomitants *of* family social status affecting child behavior. Perhaps certain of the findings are readily perceivable as directly related to the economic aspects of class, such as these children's possession of more or fewer story books, educational background of mothers, ability to employ baby sitters, time of arising and going to bed. But do not these apparently economically-based circumstances in themselves contribute to the verbal-emotional-values matrix of the growing child and hence affect his or her behavior, including his degree of linguistic sophistication?

It would appear to be more profitable at this point to acknowledge that social-class factors have, in all probability, directly or indirectly influenced the results of this study, and then go on to an analysis of the findings on their own merits. Perhaps if we accept that greater or less linguistic ability is *part of the matrix* of social-class-associated behavior, which other studies than this one have also found, then we can ask what are some of the *other* factors within this matrix which this study has found to be associated with greater or less verbal skill?

Analysis of the children's own perception of family interaction (pp. 99-102) would seem to warrant the following conclusions on a group basis:

1. The high-scoring children are surrounded by a much richer verbal family environment than are the low-scoring children:
   a. they have more books available to them,
   b. they are read to by personally-important adults more than are the low-scoring children.

2. The high-scoring children seem to have more opportunities for emotionally positive interaction with their parents than do the low-scoring children:
   a. they are read to by their parents, which they report in a context of appreciation;
   b. they are "taken places" by their mothers, which they report in a context of appreciation;
   c. the low-scoring children, in comparison with the high-scoring children, are unaware of ever having experienced a feeling of happiness or they have difficulty in verbally "pinning down" experiences which have been happiness-inducing for them.
3. Both groups are negative towards their parents' methods of discipline which, however, appear to differ for the two groups:
   a. the high scorers seem to be subjected to controlling, preventing and prohibiting disciplinary techniques on the part of their parents, while the low scorers seem to be liberally treated to direct physical punishment administered by either or both parents.
4. The low scorers seem either to have limited imaginative ability or are unable to express what imagination they do possess. (It should here be interjected that the interviewer allowed ample time for the child to answer and/or rephrased the question in different ways before accepting an "I don't know" or only one response when three were requested.)

Analysis of the differential responses of the mothers of the low scorers and of the high scorers on home routine and personal background (pp. 100, 103-105) would seem to warrant the following conclusions:

1. The day of the mothers of the low-scoring group is reported by them as starting earlier and ending earlier than does that of the mothers of the high-scoring group. To what extent this circumstance may limit the opportunities for interaction with their children is unknown.
2. The high-scoring group are reported by their mothers as experiencing a shorter time lapse between breakfast and the midday meal than are the low-scoring group. To what extent this circumstance may affect the relative attentiveness and concentration of each group in the school setting is unknown.
3. The mothers of the high scorers appear to lay more stress than do the mothers of the low scorers on responsibility for self as the focus of home-duty expectations.
4. The mothers of the high scorers are much more likely to be of professional level in education and premarital occupations than

the mothers of the low scorers. Further, more of the high scorers' mothers are actively engaged in professional or high-level clerical occupations. To what extent the superior linguistic environment which this circumstance represents has affected and affects the current verbal skill of their children is unknown, but it may safely be concluded that the effect must be considerable.

Analysis of the actual day-by-day instances of parent-child interaction as reported by the mothers (pp. 105-107) would seem to warrant the following conclusions:

1. There appears to be a radically different atmosphere around the meal table from the child's point of view for the high scorers than for the low scorers. More frequently for the high scorers mealtime at home, particularly the first meal of the day, serves as a focus for total family interaction. Further, this interaction seems to be positive and permissive in emotional tone for these children and has a high verbal content—that is, the child is talked to by adults with mature speech patterns and talks to them. The opposite situation apparently exists for the low scorers. There was, in fact, indication from the responses of some of these mothers that they actively discourage or prohibit their children's "chatter" and/or refuse to engage in conversation with them during meals and that this prohibition is based on a belief that talking during meals is a "bad" practice. One low scorer's mother's response to "Did anyone talk to (child) while she was eating her meal?" was "I do not allow her to talk while she is eating, it is a bad habit."

   To what extent the apparently more limited opportunity for the low scorers to interact verbally with personally-important adults has contributed to their lower degree of verbal skill is unknown.

2. Parents of high scorers appear on a consistent basis to express their affection for their children in some overt manner; conversely, parents of the low scorers do not consistently give their children overt signs of affection. This circumstance, coupled with the child-perceived physical punishment role of these parents (which is reacted to by these children with a good deal of bitterness, judging by the emotional tone of responses during the interviews), tends to give some insight both into the general emotional atmosphere of the low scorers' family life on an objective level and into how the child is affected by this atmosphere on a subjective level. Contrast with the high scorers, who perceive their parents as having a controlling and limiting role, but for whom this circumstance is counterbalanced by concrete evidences that these

controlling persons also love them. The low scorers do not seem to be provided with this clear-cut assurance.

To what extent these differential family atmospheres are translated into differential adjustments to the adult-controlled classroom setting on the part of these two groups of children is unknown.

Implications and Recommendations

The major implications would seem to stem from the generalized conclusion that these children, by the time they entered school, had already had specific, "patterned," family-based experiences which had influenced their degree of readiness to read. The extensive studies of W. L. Warner and of Allison Davis have established that middle-class children have a superior advantage over lower-class children in the school setting because of our schools' middle-class values, methods and emphases—more particularly because of the school's emphasis on verbal performance, in which the lower-class child is handicapped. This study throws light on some of the reasons for the lower-class child's verbal handicap and shows again that the middle-class child has a superior verbal advantage even before he enters school—an advantage which the school apparently enhances and reinforces.

The writer cannot agree with Davis, however, in his recommendation that the school should place less weight on verbal-skills' training throughout at least the early grade school years in order not to penalize the lower-class child to the extent that it does (1).

Competence in the communication skills is far too essential in our highly complex society to suggest less rather than more educational stress on them. Alas, from what is known of the relationship between symbolism, verbal and otherwise, and the capacity to carry on abstract and conceptual thinking—the so-called higher thought processes, to be handicapped in the scope of one's verbal skills is to become handicapped in achieving one's intellectual potential, whatever one's mother tongue may be. It seems to this writer that for the schools to place less emphasis on the verbal skills would be to penalize the lower-class child even more than it does at present and to make the gap between lower-class and middle-class child even wider as time goes on because of the middle-class child's superior verbal environment at home. The answer would seem to lie, rather, in the schools' recognition of the extent and nature of the lower-class child's handicap and as a result, plan an appropriate instructional program for its pupils who are low in linguistic skills. Such a plan would as rapidly as possible provide such students with the kinds of emotional, motivational and verbal experiences which at least the sample of low-scoring children studied appear to have lacked at the time of entering school. This approach, while not penalizing the middle-class child because he can be given more ex-

plicitly verbal training from the beginning, should serve gradually to narrow the gap in experience, and as a result, in linguistic skill, between these groups.

Specifically, the lower-class child of this study seems to lack chiefly two things upon entering school as compared with the middle-class child of this study: a warm positive family atmosphere or adult-relationship pattern which is more and more being recognized as a motivational prerequisite for any kind of adult-controlled learning, not only of the verbal skills; an extensive opportunity to interact verbally with adults of high personal value to the child and who possess adequate speech patterns. In order to help the lower-class child reach the verbal level of the middle-class child it would seem that the first step of the school ought to be to "fill in" these experiential gaps in the child's life.

Two closely related aproaches, the first preferable to the latter, are suggested as possible means of filling in these gaps. Publicly supported nursery schools and kindergartens among the lower-class population in particular (at present those who least need them have them), staffed with teachers best-trained and best-equipped from the point of view of "personality." Such schools could start to fill in these emotional, motivational and verbal gaps at an early enough age—3½ e.g.—for the results to show by age 6.

Until such a public program is instituted, the other feasible alternative would seem to be a drastically revised institutional program for at least the first two years in those elementary schools with a majority of lower-class children.

The following suggestions are based not only on the findings of this study but on the implications of much recent research on the teaching and the learning of reading. First, classes or subgroupings should be small enough so that the adult can directly interact with each child on an individual basis many times during the course of a school day. Second, the major part of the first school year should be devoted to building up a warm, positive interpersonal relationship between teacher and child through whatever means are meaningful *to the child*. Shared play activities, many opportunities for student self-expression to which the teacher can react with approval, frequent opportunities to relax in the teacher's arms as she reads from a book in clear view to both, are only two suggestions. In any case, the formally-conducted rigidly-controlled Grade I classes with 40-50 pupils to one teacher, still very much extant, must be considered the most inappropriate motivation for learning possible, if the findings of this study can be considered to have any implications relevant to the school setting.

Third, many and varied verbal-reading experiences should be introduced in a consistently positive emotionally-toned context and at first as part of the general background of stimuli impinging on the child. The sound of the teacher's voice telling stories, chatting, reading content meaningful to the child, should be a familiar and a welcome experience to the verbally handicapped Grade I and II child. Also, extensive opportunities to leaf

through, explore and ask questions about briefly-captioned picture books depicting objects and situations close to the child's experience should be provided. Thereafter, the currently emerging approach of using reading and speaking experience and skill as means to an end rather than as ends in themselves (which a few upper-middle and upper-class schools are now apparently doing, as reported in *Life* of October 16, 1950) should develop easily.

A controlled two-year study, in which two groups of lower-class verbally-handicapped children would be involved, should be undertaken as a test of the recommendations suggested. The two groups should be originally matched for age, "intelligence," degree of reading-readiness and "personal adjustment." One group should then be exposed to the usual ongoing Grade I and II curriculum and the other to the kind of approach suggested above, with the teacher acting as a constant variable, if at all possible. Retesting of both groups at the end of the two-year period should reveal the relative effectiveness of each approach.

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IMPACT OF FIRST GRADE ENTRANCE UPON THE SOCIALIZATION OF THE CHILD: CHANGES AFTER EIGHT MONTHS OF SCHOOL

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In a previous paper we reported our attempt to get, by means of interviews with mothers, at certain changes in the socialization process as a result of first grade entrance (7). From what mothers told us, we concluded that, contrary to the negative picture of sixness presented by Gesell, there is a decrease in behavior problems with most children at six, and a marked growth in general maturity, responsibility, independence, and self-control. Change in ego-development was noted, with the child reported as evidencing a marked increase in self-esteem. With first grade entrance comes a feeling of bigness, of importance, of participating in the kinds of activities older children and adults do, namely, reading, writing, and number.

These conclusions were reached from material presented to us by 212 mothers in an interview which took place after approximately three months of school. Our next interview was held after eight months of first grade life. Our purpose was to see (1) whether the improvement in adjustment noted by mothers persisted; (2) whether negative changes in adjustment noted by mothers occurred with change in attitude toward school and teacher; (3) whether parents differed according to social class in attitude toward the school.

1. *Does improvement in adjustment persist?*

There are conflicting opinions in the literature concerning behavioral changes at six. With regard to kinds of change, we have the position of Gesell and others that the six-year-old is "out-of-focus"; that is, he is explosive, rebellious, rude, stubborn, brash, boisterous, and the like (4, p. 89).

On the other side of the picture we have those who feel that the child is not highly emotional, explosive, expansive and undifferentiated,—but is rather easier to get along with than ever, one who is controlled, less wilful, and gives less trouble generally than ever before. Bowley says, "There is less emotional intensity. The early violent feelings (before five years of age when control is weak) . . . are more controlled, repressed, or diffused. The child has learned to deal more adequately with internal tension and has normally made a fair adjustment to external conditions . . ." "In general, the period from 6 to 11 years is one of *comparative stability* and real intellectual advancement is achieved, unembarrassed by emotional difficulties" (1, p. 81).

It is obvious that this description gives us a different notion of what to expect from the six-year-old than the Gesell position. Bühler for the most

part, is in harmony with Bowley on this specific point when she tells us, "The wilfulness and laxness of the 2-4 year-old is replaced to a certain extent by the serious attitude of the 5-8 year-old . . . It is, for instance, a matter of common knowledge that the child between the second and fourth year is especially difficult to handle" and "The 5-10 year-old presents relatively the fewest difficulties" (2, p. 142). The Bowley-Bühler picture of development is more in agreement with the kind of description of sixes which our parents gave us (7).

While our interviews with mothers indicated improvement in behavior after three months of school, it was conceivable that the results might have been a function of the time factor. We hypothesized that there might have been a honeymoon period, and that after the glamor of entering first grade had worn off, the child might revert to the kind of six-year-old behavior Gesell describes. In this connection, Brooks reports, "The first reactions of children to school are not necessarily complete indications of the real personality of the children. A study of forty seven-year-old boys just entering school in Germany showed that 13 were confident, 16 indifferent, and 11 were shy. The early over-submissiveness to the teacher's authority tended to disappear during the first six weeks" (3). Our first purpose, then, in doing this particular study, was to see whether improvement in behavior persisted throughout the child's attendance in first grade.

2. *Where negative changes occur, is there also change in attitude toward school and teacher?*

Not only are there conflicting opinions in the literature with regard to what kind of child the six-year-old is, but also with regard to the cause of changes in his behavior. On the one hand, we find the theory expressed that development is inevitable. The Freudian instinct-theories that attributed changes in development to biological causes might be mentioned in this connection. And although Gesell by no stretch of the imagination could be accused of being Freudian, we do find him stating with regard to the six-year-old, "New propensities are erupting; new impulses, new feelings, new actions are literally coming to the surface, because of *profound developments* in the underlying nervous system" (4, p. 89).

In our first report, we contended that any change in the child at six is not a function of the genes but is a result of the change from kindergarten and home to the elementary school. In discussing school entrance Skinner and Harriman state, ". . . there are bound to be factors . . . so potent in their influence upon the growing consciousness of the developing social being that the child has no pattern of behavior ready for the new set of social stimuli. One such set of circumstances occurs when the child leaves the kindergarten or the sheltered home environment for the regular elementary school group" (6, p. 229). Murphy and Newcomb take this very position when they say, "Entrance into the conventional first grade marks a sharp break in the actual structure of the child's experience. For the first time in the case of many children, they are expected to conform to a group

pattern imposed by an adult who is in charge of too many children to be constantly aware that each child is an individual. Flash cards are flashed at the group all at once. Stories are told and everyone must listen whether he will or not. Drawing paper and crayons are handed out whether you happen to feel like drawing at that moment or not. One child who found this shift quite beyond endurance remarked after his first day in school, 'It's awful; all you do is mind all day long.' And another day he added, 'It is really awful. All you do is sit and sit and sit' " (5, p. 652). Conceivably such experiences could effect changes in behavior in the six-year-old. In order to see whether any negative changes in behavior reported by parents occurred with change in attitude toward school and teacher, we asked mothers to tell us when such changes, if any, occurred. We asked, also, about changes in attitude toward school, and about likes and dislikes for school activities.

3. *Do parents differ according to social class in attitude toward school?*

Our third purpose, to see whether there were social class differences in parental attitude toward school that might conceivably affect adjustment, has received some attention in a previous paper (8). Five different areas were examined in that paper: preschool attendance, parental educational aspirations for the child, preparation for school, parental criticism of the school, parental reception of report card. Significant social class differences in preschool attendance, parental expectations for the child's education and parental preparation of children for first grade skills were found. No social class differences were found in parental criticisms of the school. Parents were found to differ somewhat according to social class in the way in which they received the first report card.

In our third interview we wanted to see whether social class differences in two of these areas appeared toward the close of the school, namely, criticism of the school and reception of report card. As was noted in the previous paper, statements appear in the literature to the effect that lower classes are more hostile toward the school and more openly critical of it. While these did not appear during the first few months of school it was conceivable that they might appear later on. With regard to report card, it was reasoned that since the report card is an important indicator of how well the school thinks the child is doing, in those homes (upper-middles) where the values of the school are reinforced, the card would be seriously received. Good reports would be approved and poor reports frowned upon. Furthermore, upper classes might hold up higher standards of achievement and might so indicate in their rewards to the child. As has been indicated, some trend in this direction was noted in the second interview and a further check was desired at this time.

Procedure

An interview, the third in a series, was conducted with 202 mothers of first grade children in a Midwestern community approximately eight

TABLE I

DISTRIBUTION OF 202 FAMILIES IN A MIDWESTERN COMMUNITY ACCORDING TO SOCIAL CLASS

Social Class	*Number of Families*	*Per Cent*
Upper	8	4
Upper Middle	48	24
Lower Middle	59	29
Upper Lower	73	36
Lower Lower	14	7

months after the start of first grade. Six experienced persons did the interviewing on the same sample of mothers as we had used in our two previous interviews.

Distribution of families according to social class is reported in Table I. This distribution was obtained by using the technique worked out by Warner, Meeker and Eells (9). Occupation, house type, dwelling area and source of income were used in class typing.

The interview form is included at the end of this report.

RESULTS AND DISCUSSION

1. *Changes in Behavior Noted by Mothers*

As can be seen in the interview form, each parent was asked to give her judgment as to whether her child showed more, less, or the same degree of

TABLE II

FREQUENCIES OF CHANGE IN CERTAIN BEHAVIORAL TRAITS AS REPORTED BY 202 MOTHERS

	MOTHERS REPORTING			
Trait	*More* f	*Same* f	*Less* f	*Total* f
Maturity	180	14	3	197
Self-control	104	72	21	197
Helpfulness	131	43	19	193
Responsibility	145	37	13	195
Patience	65	70	63	198
Disposition	95	58	47	200
Obedience	74	80	39	193
Self-confidence	157	26	9	192
Getting along with playmates	123	60	7	190
	1074	460	221	1755

a number of different traits. In the first of these, the term maturity or grown-upness was considered an overall estimation of behavior; self-control, helpfulness, responsibilty, patience, disposition, obedience, self-confidence, and getting along with playmates were subsumed as specific behavioral traits. Frequencies for each are reported in Table II.

As can be seen from Table II, an overwhelming majority of mothers reported children improved with regard to most of the behavioral traits in question. In only two instances do we find this not to be true. In respect to "patience" and "obedience" slightly more mothers reported the child was the same rather than improved. The reader will also note that a sizable minority of mothers reported change for the worse in regard to "patience," "disposition," and "obedience," more so than for any of the others. A *chi-square* analysis, however, showed that with regard to every trait except one there was a significant difference away from deterioration in behavior and in most cases toward improved behavior. The one exception was "patience" where no significant difference appeared.

The question of interpretation arises here. While the general picture of adjustment at six as reported by mothers is highly favorable when we total the positive responses to specific traits, it might very well be that the three scores were highly important to mothers. Thus a mother might note that the child was more helpful and more responsible, but this might not be as traits of obedience, disposition and patience where we found many negative important to her as to have a patient, obedient child with a pleasant disposition. Gesell reports, "Six is a trying age for many a parent. One of our parents reports that she dreaded to get up in the morning because it meant one continuous contest with her 6-year-old,—one long 'fight, fight, fight!' " (4, p. 117).

In order to see whether the negative scores for obedience, patience and disposition might outweigh the other traits in value to the point where mothers would find six a trying age, we posed that very question. We asked whether the year had been a more trying one, the same, or an easier one. Mothers responded thusly:

	f
The year has been more trying than the previous one	30
The year has been the same in this respect	60
The year has been an easier one	112

It would seem then, in so far as we can judge by what our parents told us, approximately 14 per cent of our mothers found the year more trying, 29 per cent reported it to be the same, and over 50 per cent of our sample said the year had been an easier one. In general, then, we can say that the improvement in behavior noted by parents during the first few months of school persists throughout the year and that our hypothesis regarding a honeymoon period was not substantiated.

2. Negative Changes in Behavior and Attitude Toward School and Teacher

Here we were interested in exploring possible causes for change in behavior. It was conceivable that improvement or deterioration in behavior might be tied up with a change in attitude toward school and teacher. In previous interviews parents had reported that children looked forward to school with great anticipation and that after three months in school children liked it and their teacher very much. Now we asked whether children seemed to like school and teacher more, less or the same as they did at first. The answers were:

	f		*f*
Liked school more	88	Liked teacher more	73
Liked school same	91	Liked teacher same	101
Liked school less	10	Liked teacher less	9

From what parents tell us, then, it would seem that first grade children like school, and that for many, liking increases with the school year.Where school was liked less or disliked, in seven cases teacher was also liked less. Where school was not liked, eight parents reported a more trying year. Because so few children disliked school or deteriorated in their attitude toward it during the year, no conclusion can be drawn as to whether attitude toward school has anything to do with changes in behavior.

Where liking for school increased, according to the mothers, the rationale for the change was mainly that the child was getting "acclimatized" to school. Explanations such as "He is getting used to the new situation," "increased and expanded interests," and "disappointed that she didn't learn to read right away, but when she started reading she was more interested" were comparatively prevalent. Some parents also reported, "She was worried about the big boys at first," "sense of achievement in going to school with the children," and "She used to be afraid of authority, but now she knows teacher better."

The things about school the child likes best were quite specific. Here we find reading far in the forefront with about 90 per cent of the responses in this direction. Next we find the answer "everything." A scattering of parents mentioned numbers, musical activity and art. But reading, according to parents, is almost synomymous with first grade in children's minds. This may represent wishful thinking on the part of mothers who want children to learn to read in Grade I or it may actually be the most popular activity, perhaps because of its prestige in the school and adult world.

We also asked what the child disliked most about school. The substitute teacher, the strictness of teachers, and the roughness of other children were most frequently mentioned. Here we see answers like "The substitute teacher jerked her around," "Teacher is mean," "too strict," and "Teacher wouldn't let child participate in activities." Some children complained about the little playground activity, others thought there was too much. Some said they didn't like working with clay or reading or writing,

and "Teacher promises a surprise and then forgets." The reaction of the parents when children complained is generally to favor the school. Parents are apt to say, "Mind her (the teacher) and pay attention," "It's hard for a new teacher to walk into a strange class." "Help her by cooperating," "You have to get used to different teachers," and "Tell the teacher when the children are rough." A number of parents replied that they made no comment when the child complained and some even said, "I laughed!"

3. *Social Class Differences in Attitude Toward School at Grade I Level*

As has been indicated in the introduction we were interested (1) in whether there were social class differences in parental attitude toward the school as indicated by criticism of the school, and (2) whether parents differed according to social class in reception of report card.

When we decided to analyze the data according to social class it was obvious that theoretical frequencies in the upper- and lower-lower class would be too small for valid testing. Hence, we chose to analyze the differences among the upper-middle, the lower-middle, and the upper-lower classes. We hypothesized that our data would fall in these social classes in the ratio 24:29:36, the same ratio as these classes fell in our total sample. Wherever there were three categories, one of which alone had a low frequency, causing significant *chi-square,* we decided to test for significant differences in the remaining categories. In this way we could get information as to the chief positive contributor to the significant *chi-square*. Answers to each question will be reported separately.

a. Do you think anything differently should be done by school or teacher?

Chi-square analysis revealed significant differences according to social class at the 5 per cent level in answers to this question. The main positive contributor was the upper-middle class. The difference between upper-middles and upper-lowers taken separately, however, did not yield a significant difference. Results are shown in Table III.

Foremost among the criticisms of the school were "They should teach reading by phonetics," "The school is too overcrowded," and "inadequate

TABLE III

RESPONSES BY SOCIAL CLASS TO THE QUESTION, "DO YOU THINK ANYTHING DIFFERENTLY SHOULD BE DONE BY SCHOOL OR TEACHER?"

Social Class	*Yes* f	*No* f
Upper	6	2
Upper-middle	43	24
Lower-middle	16	16
Upper-lower	32	28
Lower-lower	3	9

playground facilities." There were varied complaints about the teachers. Among these were "too lax in discipline," "too much discipline," "teacher expects too much," and some implied that the teacher was "too nervous." Other complaints varied from "PTA should be improved" to "Emotional problems are teacher's fault, she lets children grow like weeds!"

b. Do you think your child is getting a proper education?

As can be seen from Table IV, there was agreement that the child is getting a proper education and no social class differences appeared.

TABLE IV

RESPONSES BY SOCIAL CLASS TO THE QUESTION, "DO YOU THINK YOUR CHILD IS GETTING A PROPER EDUCATION?"

Social Class	*Yes* f	*No* f
Upper	6	2
Upper-middle	57	7
Lower-middle	41	6
Upper-lower	51	6
Lower-lower	10	1

c. What do you do if the child has a complaint about school?

The direction of responses for each class was obviously away from defending the child as Table V reveals. In the upper-middle class there was a significant difference in the direction of defending the school. In the "Other" category, 70 per cent of the replies said, "talk to the teacher and get the facts first" and most of the rest agreed that it would "depend on the problem."

TABLE V

RESPONSES BY SOCIAL CLASS TO THE QUESTION, "WHAT DO YOU DO IF THE CHILD HAS A COMPLAINT ABOUT SCHOOL?"

Social Class	*Defend School* f	*Defend Child* f	*Other* f
Upper	5	0	3
Upper-middle	43	2	21
Lower-middle	20	2	27
Upper-lower	23	0	32
Lower-lower	3	0	8

d. How did you feel about your child's last report card?

It should be noted here that the range in marks is not great in first grade, with the great majority of the students getting next to the best mark according to the marking system in the schools in this Midwest town. No significant social class differences were found. Results are shown in Table VI.

TABLE VI

RESPONSES BY SOCIAL CLASS TO THE QUESTION, "HOW DID YOU FEEL ABOUT YOUR CHILD'S LAST REPORT CARD?"

Social Class	*Very Pleased* f	*Somewhat Pleased* f	*Displeased* f	*Very Displeased* f
Upper	5	2	1	0
Upper-middle	50	14	1	0
Lower-middle	33	12	3	1
Upper-lower	45	11	2	2
Lower-lower	8	2	0	1

e. Do you have a system of rewards and punishments . . . (where report cards are concerned)?

In categorizing the types of rewards and punishments 95 per cent were involved in increasing the child's "material wealth," i.e. gift or money. Money was mentioned explicitly in 58 per cent of the total affirmative responses. No significant social class differences were found. Results are shown in Table VII.

TABLE VII

RESPONSES BY SOCIAL CLASS TO THE QUESTION, "DO YOU HAVE A SYSTEM OF REWARDS AND PUNISHMENTS . . . (WHERE REPORT CARDS ARE CONCERNED)?"

Social Class	*Yes* f	*No* f
Upper	2	6
Upper-middle	15	52
Lower-middle	16	33
Upper-lower	16	45
Lower-lower	3	8

SUMMARY

Follow-up interviews with 212 mothers of first grade children were conducted to see (1) whether improvement in behavior noted after school

entrance persisted through the child's first grade year, (2) whether negative changes in adjustment noted by mothers occurred with change in attitude toward school and teacher, (3) whether parents differed according to social class in attitude toward the school.

Results indicated that the picture of improved behavior at six, described previously by mothers, persists according to what mothers tell us. With respect to every trait except one about which mothers were questioned, there was a significant difference away from deterioration in behavior.

Because so few children were reported as changing in attitude toward school and teacher after eight months of first grade life, no conclusion can be drawn as to whether change in attitude toward school has anything to do with changes in behavior.

With regard to attitude toward school, a significant difference at the 5 per cent level appeared in answer to the question as to whether anything different should be done by school or teacher, with upper-middle class parents most frequently responding affirmatively. Parents of all classes agree, however, that their child is getting the proper education. Upper-middle class parents are more apt to defend the school when their child complains. No social class differences were found with respect to reception of report card.

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EFFECTS OF FRUSTRATION ON CHILDREN'S PAINTINGS

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The reactions of a human when frustrated have formed an important area of study for psychologists and psychiatrists. Research has indicated that one of the psychological mechanisms most often used in an attempt to master a frustrating situation is *regression*. Regression (sometimes called *retrogression*) may be defined in a broad sense as *reverting to behavior of a lower level of maturity when faced with a problem.*

Another area of interest to students of personality function has been that of art products, which have been regarded as at least partial reflections of personality. Investigators (1, 2, 14) have presented evidence to support theories that paintings of children are indices of psychological maturity and that children often use paintings as media for expressing both observable and hidden emotion. Despite the numbers of studies in which attempts have beeen made to determine the correlation between types of child art and personality functions, the real psychological meaning of child art is not at all commonly agreed upon among psychologists (15). The greatest limitation in the use of drawing and painting for diagnostic purposes has been summed up by White (9, p. 246) who says that although there is ". . . no lack of ingenuity and stimulating ideas, the crying need is for validation."

The present study was made to add experimental evidence to the meaning of child art by relating the above fields of interest: (*a*) frustration and regression and (*b*) child art as a projective material. The specific purpose of the investigation was to determine whether nursery-school-age children paint pictures at a lower developmental level following a frustrating situation than they do following a nonfrustrating or less frustrating situation.

DERIVATION OF THE POSTULATE

The central postulate tested in the experiment derived from conclusions drawn in two previous investigations.

One investigation was the Barker, Dembo, and Lewin (3, 4) study of the effects of frustration on the behavior of thirty nursery-school children. In this experiment the behavior of children in a non-frustrating or free-play situation was compared with their behavior in a frustrating situation. The authors reported that their data ". . . establish rather definitely the fact that a frustrating situation of the kind considered here reduces, on the

average, the constructiveness of play below the level upon which it normally occurs in a nonfrustrating, free-play situation" (4, p. 452).

The other investigation used to develop the central postulate of the experiment was a comprehensive study of the art work of nursery-school children reported by Alschuler and Hattwick in *Personality and Painting* (1). After studying the paintings of 150 nursery-school children for one year, Alschuler and Hattwick concluded that children reveal their levels of psychological maturity by *color preference, line-type preference,* and *use of form.* In regard to color, the authors observed that younger children use more red and warm colors, and older children use more blue and cool colors (1, p. 104). They also concluded that younger children use more curved lines and circles, and older children use more horizontals and verticals. Concerning developmental trends in the use of form, Alschuler and Hattwick stated that among the youngest nursery-school children two stages of scribbling could be discerned. Slightly older children experimented with line and form; and beyond this experimentation level, four types of painting were found: (*a*) repetitive themes, (*b*) abstract patterns, (*c*) symbolic representation, and (*d*) realistic representation. For the present study these maturity levels were placed on the following six-step scale:

1. *Earliest Scribbling.* Strokes are short, broken, and scattered, seemingly the result of uncontrolled movements.

2. *Rhythmic Scribbling.* A single mass results from a rhythmic back-and-forth swing.

3. *Experimentation with Line and Form.* Lines are drawn with no thought of relating or organizing them.

4. *Repetitive Themes.* Paintings are characterized by color and mass techniques rather than form.

5A. *Abstract Painting.* Work is increasingly stucturalized, seemingly forming an abstract pattern.

5B. *Symbolic Representation.* Highly individualized forms of representation are made; painting tends to depict the feel of things rather than the look.

6. *Realistic Representation.* Conventional, usually accepted patterns of representation are painted.

Thus, Barker, Dembo, and Lewin concluded that nursery-school-age children move to a lower level of play-constructiveness when their play desires are frustrated. Alschuler and Hattwick presented evidence to support the theory that nursery-school-age children use color, line, and form differently at different ages; an age scale for color, line, and form was derived from these writers. The evidence from these two studies formed the basis for the central postulate tested in the present experiment: *Under*

more frustrating conditions most nursery-school-age children will paint at lower developmental levels than they will under less frustrating conditions.

Experimental Design

An experiment was planned to test the frustration-regression postulate. Forty nursery-school children were selected. They ranged in age from two years to four years and ten months. Ten boys and ten girls were used for the experimental group and were paired by age with ten boys and ten girls for the control group. Each child in the experimental and control sections took part in three individual play and three individual painting situations. The first play experience (situation *A*) was identical for both groups. The second and third play experiences (situations *B* and *C*) for the experimental group differed from those of the control group in that the experimental children were frustrated and the control children were not. The successive experiences are outlined below:

Experimental Group	*Control Group*
Nonfrustrating Play Situation *A*	Nonfrustrating Play Situation *A*
Painting Situation *A*	Painting Situation *A*
Five-minute Recess	Five-minute Recess
Frustrating Play Situation *B*	Nonfrustrating Play Situation *B*
Painting Situation *B*	Painting Situation *B*
Five-minute Recess	Five-minute Recess
Nonfrustrating Play Situation *C*	Nonfrustrating Play Situation *C*
Painting Situation *C*	Painting Stuation *C*

Procedure

During each play and painting session, the experiment room contained only one child, the experimenter who presented toys one at a time to the child, and an observer who sat ten feet away and recorded actions and conversation.

Room equipment used consisted of a child-size table, two child-size chairs (one for experimenter and one for child), an easel, and an easel-tray containing brushes and eight colors of poster paint. Toys used during play sessions consisted of (*a*) a plastic tumbling clown, (*b*) a barking dog, (*c*) a telephone, (*d*) a red fire truck, (*e*) a cowboy gun and holster, (*f*) an accordion, (*g*) a blond girl-doll, (*h*) a set of five kitchen utensils and a small plastic teeter totter, and (*i*) three small trucks. Each of the toys was in a colored box with the exception of the barking dog which was in a coffee can.

Each ***nonfrustrating play situation A*** consisted of the experimenter's taking three boxed toys (one at a time) from a large carton. Each was

presented as a "game" to the child who was encouraged to play as he liked. The experimenter was quite friendly and played if the child wished. When the child tired of the toy or asked for another, he was given another box to open until the three (clown, dog, and telephone) had been presented. Then the child was asked, "Now do you know the next game we always play? It's the painting game. See the big cans of paint over here and the clean paper? We fixed this so you could play. You can paint anything you want." The child was allowed to paint until he indicated that he was through. He was allowed to paint as many pictures as he wished.

Nonfrustrating situations *B* and *C* for the control group proceeded the same as situation *A* except that three new boxed toys were presented each time. The experimenter was permissive; the child could play as he desired. However, for the experimental group, situation *B* was planned as a frustrating situation. Although the experimenter initiated the session as he had situation *A*, this time he did not allow the child to open the boxes as each was taken from the carton. Instead, the experimenter rattled each box and asked, "What do you suppose is in this?" When the child reached for the box as he had learned to do in situation *A*, the box was held out of reach. Finally the experimenter opened the box, showed the toy to the child, demonstrated how the toy worked, and then placed the toy in sight on the floor beside the table. The child was told that he was not to touch the toy nor play with it. This process was continued until the fire truck, gun, accordion, and doll were in sight on the floor. The brightly colored Christmas boxes containing kitchen utensils, teeter totter, and small trucks were not opened for the child. However, as the child watched, they were rattled, and the experimenter peeked into each one and exclaimed "Oh" before placing it unopened on the floor beside the other toys. At this point the child was told that the "next game" was the "second painting game." As in situation *A*, the child had an opportunity to paint anything he liked, but he was not allowed to touch the nearby toys or the unopened Christmas boxes. After painting as many pictures as he desired, the child was told that he could open the boxes and play with all of the toys. This free-play opportunity became play-situation *C* for the experimentals. When the subject had tired of the toys, he was given an opportunity to paint again (painting situation *C*). (Situation *C* was included in the experiment so that the test experience would end on a satisfying note. Because some children did not wish to paint during situation *C*, these paintings were not used in the final analysis.)

Evidence for Frustration

A crucial element of the study was to present convincing evidence that the experimental children were actually operating under the influence of more frustration when they painted in situation *B* than when they painted in situation *A*. In addition, it was necessary to present evidence that the control children were not operating under more frustration in one situa-

tion than in the other. Evidence that more frustration was established in situation *B* for the experimental group was provided in the following four ways:

(*a*) Test items (toys) were selected and presented to fulfill the requirements of establishing universal interest and goal-directed striving.

(*b*) Test items were administered in a manner that insured a child's repeated striving for goals and his continual failure to attain the goals. During play situation *B* each of the twenty experimental children had overt goal-directed activity blocked at least thirteen times.

(*c*) Test items and their administration were selected so as to be similar to those in the Barker, Dembo, and Lewin study in which frustration was convincingly established in nursery-school children.

(*d*) Three judges analyzed the painting-session-observation records of the experimental and control subjects to decide which of each subject's records evidenced more frustration. One judge was a college psychology instructor, another was a school psychologist, and the third was a supervisor of nursery-school and kindergarten education. From observational reports taken during the experiment sessions for all forty children, two excerpts were selected for each child. The excerpts were painting situations *A* and *B*. The two situations for each child were typewritten on separate sheets of paper and were not identified as being selected from section *A* or *B*. Each child was identified by a code number. Thus, a person who had not seen the child during the experiment could not tell which play situation the painting excerpt followed. Care was taken during the preparation of excerpts to delete any material, other than the subject's speech and overt actions, which might have served as a clue to the painting situation described. The two excerpts from each child were presented to the three judges, each working individually. The judges were asked to compare each child's two records and to place the one that appeared more frustrated in one pile and the less frustrated in another pile. Thus, an attempt was made to test the following hypothesis: *Children of the experimental group will show more symptoms of frustration during painting situation B than during painting situation A. Children of the control group will show no more symptoms of frustration during one painting session than another.*

Chi-square analysis of the judges' combined ratings indicated that the experimental group during painting situation *B* was significantly more frustrated than in situation *A* (*chi-square* of 6.05, significant at .02 level). *Chi-square* analysis indicated that the control group was not significantly more frustrated in one painting situation than in the other (*chi-square* of 1.25, not significant at .20 level).

Results

The children's paintings were analyzed to determine whether: (*a*) the age difference in the use of color, line, and form were found in the present

study as they were in the Alschuler and Hattwick study and (*b*) the frustrated children in situation *B* showed evidence of regression in use of color, line, and form.

Color Analysis: Two raters, working separately, anlayzed each of the 154 paintings produced by the forty children. To secure a measurement of color "preference," five quantities were distinguished for each of the eight hues (red, orange, yellow, green, blue, purple, brown, and black). These quantities were represented by five fractions: one-eighth, one-fourth, one-half, three-fourths, and one-whole. The quantity of a given hue was defined as the percentage of that color used in relation to the total amount of paint used on the paper.

The two raters agreed as to what hues were present in 99.09 per cent of the color decisions. The reliability of the raters in using the five-quantity scale was determined by computing a product-moment correlation coefficient for each hue. These coefficients ranged from +.87 (yellow) to +.98 (purple).

Color Preference by Age: The Alschuler and Hattwick study (1) presented data to support the theory that children's color preferences change between ages two and five. The general change, according to these authors, is from a preference for red and warm colors to a preference for blue and cool colors. This color-preference theory was tested in the present study by analysis of the first paintings of each of the forty children in situation *A*, the one situation common to all subjects. Color-preference analyses were made for two kinds of age divisions: (*a*) younger 20 compared with older 20 children and (*b*) youngest 13 compared with middle 14 compared with oldest 13 children. (In the first comparison the ages of *younger* children ranged from two years two months through three years nine months; *older* children ranged from three years nine months through four years ten months. In the second comparison the *youngest* ranged from two years two months through three years one month, the *middle* children ranged from three years two months through four years, and the *oldest* ranged from four years three months through four years ten months.) Comparisons of the mean amount of each hue used by each of the above groupings *failed to support the theory that younger children use more red and warm colors and older ones use more blue and cool colors.* For the children in this study, the color-preference generalizations made by Alschuler and Hattwick did not hold true.

Regression in Color Use: Mean differences in the amount of each hue used in situation *A* as compared to situation B were computed for experimental and control groups. Neither group showed any significant increase or decrease in the amount of any hue used. Thus, the hypothesis that children will "regress" to use more red and warm colors when frustrated was rejected. (This analysis was made despite the fact that no age difference in color preference was found in the present study.)

Line-Type Analysis: In a manner similar to that described for color analysis, the types of lines used by the children were rated.

Line Preference by Age: Analysis of the children's use of vertical lines tended to support the Alschuler and Hattwick theory that younger children use *fewer verticals* than do older children. However, because of the inconsistent amounts of increase in the use of verticals with age (among children in the present study), and because of the low degree of statistical significance (.05 level) in the differences between younger and older children in their use of verticals, the results of this test of the vertical-line theory were deemed *inconclusive*. Analyses of the children's use of horizontal and curved lines *did not support* the Alschuler and Hattwick theory that younger children use significantly more curves and fewer horizontals than do older children.

Regression in Line-Type Use: Mean differences in the amount of each line-type used in situation *A* as compared to situation *B* were computed. Neither experimentals nor controls showed any significant increase or decrease in the amount of any line used. Thus, the hypothesis that children will "regress" to use more curves and less verticals and horizontals when frustrated was rejected.

Use-of-Form Analysis: The form-level of each painting was ranked by two raters according to the six-step scale outlined earlier. A reliability coefficient of (r) +.877 indicates the agreement between raters I and II in their rankings of 154 paintings.

Use-of-Form by Age: Analyses of the mean form-levels for younger and older children *supported* Alschuler and Hattwick's theory that younger children tend to paint on lower levels (defined by the six-step scale) than do older children. The differences between the mean form-levels for younger and older children were significant at the .001 level.

Regression in Use of Form: As with color and line, mean changes in form-level from situation *A* to *B* were computed. No significant difference in the use of form from one situation to the other was found. Thus, the hypothesis that children paint at a lower form-level when frustrated was rejected.

Interpretation and Conclusions

The negative results obtained in testing the central postulate are interpreted as meaning that as a group, nursery-school children of the type used in this study do not reflect temporary frustration by regressing in their use of color, line, and form in easel painting. It is believed that such a finding may be incorporated profitably in the growing body of knowledge about the psychological meaning of art products.

In addition, the present study corroborated Alschuler and Hattwick's findings concerning the relation of age to the use of form among nursery-school children. However, in regard to the relation of age to color and line preference, the present findings differed from the conclusions drawn by Alschuler and Hattwick.

To evaluate the apparent inconsistencies between the two studies, the present writer inspected the statistics upon which Alschuler and Hattwick evidently based their generalizations concerning color and form preferences. This inspection indicated that the published statistics sometimes did not warrant the generalizations (1, pp. 104, 151, 570). For example, Alschuler and Hattwick reported the percentages of children preferring red and blue at each age but did not indicate whether the percentages at one age were significantly different from those at another age. Critical ratios computed by the present writer indicated that none of the differences between percentages for either blue or red were significant at even the .10 level. These statistics appear to lead more logically to the conclusions drawn in the present study (viz., that color-preference and age for the nursery-school years cannot be accepted as being significantly correlated) than they do to the conclusions drawn by Alschuler and Hattwick.

The present writer similarly computed the standard errors of differences between percentages of children's use of vertical, horizontal, and circular lines as reported by Alschuler and Hattwick. No significant differences (even at the .10 level) were found among the percentages of children (at half-year age steps) using circular or horizontal lines (1, p. 571). Analysis of vertical-line use indicated that three-year-olds used significantly fewer (at .05 level) verticals than did children at any other age level. However, comparisons among the four age groups above the three-year level indicated no significant differences in the percentages of vertical-line use between any pair of these older children. This statistical analysis indicates results similar to those obtained with the forty children of the present study, i.e., use of horizontal and curved lines was found not to be significantly correlated with age; however, vertical-line use showed slightly significant (.05 level) but inconsistent relation to age. As with color preference, Alschuler and Hattwick appear to have generalized beyond a conservative interpretation of their published statistics in concluding that younger children use more circular lines and older children use more horizontals and verticals. Until research with larger numbers of children establishes more securely what relationship age has to color and line-type preferences, the conclusions drawn in the present study appear to the writer to be valid in view of the statistics of both the present study and that of Alschuler and Hattwick.

Hypotheses for Further Research

The reasons for negative results being obtained in testing the central frustration-regression postulate in the present study could not be identified without further research on this problem. However, below are indicated

a few of the possible hypotheses that might account for such negative findings:

(*a*) Contrary to the consistent group-regression results found by Barker, Dembo, and Lewin (3), children may react in individual ways to play frustration rather than in a single manner. Current research and clinical observations (7, pp. 598-670; 9; 11; 12; 15) indicate that humans are capable of a variety of adjustment mechanisms by which they handle frustration, so that a range of types of reactions in a group might be expected more often than one type (regression) alone. Thus, a variety of individual reactions (e.g., regression, stereotypy, apathy, aggression) might be reflected in different ways in painting. The group analyses used in the present study did not provide for measuring individual types of painting reactions to frustration.

(*b*) Easel paintings may reflect deep-seated and long-term frustration but not temporary frustration such as was established in the experiment.

(*c*) Different children within the tested group may have had different degrees of frustration tolerance. Thus, one child might have been easily upset by the experimental frustration and might have reflected this disturbance in his paintings, whereas another child might not have been disturbed enough to reflect the feeling in his paintings. The group-trend analyses used in the present study would fail to identify individual degrees of frustration tolerance.

(*d*) Easel paintings may reflect important personality characteristics in some children but not in others. Some children like to paint; others do not. Therefore, the degree to which children project important psychological phenomena may vary from child to child. Such a possibility would make clear-cut statistics difficult to obtain.

(*e*) Easel paintings may not reflect as many important personality characteristics, or feelings such as frustration, as other overt behavior does. Thus, frustration may be evidenced in speech, in facial expressions, and actions much more consistently than in paintings.

(*f*) Chronological age may not be a good basis for pairing children as experimental and control subjects. Considerable evidence has been gathered in psychology (7) to indicate that children of like chronological age may be quite different in many other ways. Thus, it is possible that criteria more closely related to frustration (such as an emotional-development scale and/or a frustration-tolerance scale) should be used in pairing subjects for such an experiment as the present one.

As seen by the above hypotheses, a more conclusive interpretation of the results of the present study awaits further research with the art work of young children.

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AN ANALYSIS OF THE RELIABILITY AND FACTORIAL COMPOSITION OF RATINGS OF CHILDREN'S DRAWINGS [1]

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THE PROBLEM

The use of children's drawings in the study of personality has received increasing attention in recent years (1, 10). Few psychologists are prepared to reject the method as being without promise; a considerably greater number of them, however, have been unable to accept the method without further study of its validity and reliability (5, 6). Particularly, they have been concerned about the seemingly great amount of subjectivity that has characterized judgments and interpretations of children's drawings (6, pp. 423-427). The somewhat mystical qualifications which one writer outlines as necessary before one can interpret children's drawings suggest that only the few, the unusually endowed, should ever aspire to such an art (10, pp. 222-223).

The present study takes the more mundane point of view that such judgments are of a tangible and objective nature and are subject to the usual investigation of their precision; specifically, it undertakes a determination of the reliability with which children's drawings can be rated, especially with regard to those characteristics which have been claimed to be of significance for a knowledge and understanding of the personality of the child; second, an identification of the factors present in a set of such scales; and third, a determination of the "profile stability" of a drawing as derived from ratings on that drawing.

THE DRAWINGS [2]

The drawings used in this study were obtained in the following manner: the child was brought to the office of the experimenter, generally known to the child, seated at a small table and provided with a black crayon and a piece of manila drawing paper, 12 × 9 inches in size, and asked merely to draw a picture of his family. No further instructions were given and the child was left to his own devices until the drawing was finished. Only one child, a second-grade girl, refused to comply with the request.

One drawing from each of 31 children was obtained in this way. The

[1] The writers wish to acknowledge their indebtedness to L. J. Cronbach for his counsel and his critical reading of this paper in manuscript.

[2] The collection of these drawings in the Institute of Child Welfare, University of Minnesota, was made posible through the kind cooperation of Professor Elizabeth M. Fuller.

artist group included 11 kindergarten children, 11 first graders, and 9 second graders, all enrolled in a university laboratory school. More specific data concerning them are presented in Table I. It is clear that from the standpoint of intellectual level these children represent a highly selected group. Furthermore, the fathers of practically all of them were engaged in professional occupations. In addition, there must be considered the fact that the children from whom drawings were obtained were those who

TABLE I

THE SAMPLE OF ARTISTS

				CA	MA		IQ	
Group	*N*	*M*	*F*	*Mean*	*Mean*	*Range*	*Mean*	*Range*
Kindergarten	11	6	5	5.8	7.0	6.0– 8.2	122.2	96–140
First Grade	11	6	5	6.8	9.1	7.3–11.7	133.0	111–165
Second Grade	9	5	4	7.9	10.2	8.1–12.5	129.4	107–170

had been identified, for the purposes of another study, as being either most secure or most insecure within their respective groups on the basis of the Wolff Security Test, the Pritchard-Ojemann Behavior Ratings Scale, and the nominations of their teachers (8).

Throughout the paper, the drawings of the kindergarten group will be referred to by numbers 1 through 11, those of the first grade group by numbers 21 through 31, and those from the second grade group by numbers 41 through 49.

CHARACTERISTICS OF CHILDREN'S DRAWINGS

What characteristics might be expected to exist in some degree in all of these drawings and also might be defined precisely enough that they could be presented to individual judges for ratings? Wolff has described certain aspects of children's drawings which he claims are expressive of security or insecurity (10, pp. 144-148). Of these, the writers arbitrarily eliminated from consideration the aspects, "surrounding lines" and "symbols of defense and aggression," as manifestations of insecurity. Each of the remaining characteristics was then so defined that a judgment that it was present in a drawing would be evidence of security, a judgment that it was absent, evidence of insecurity, according to Wolff.

A. *Symmetry of drawing as a whole.* Is the drawing symmetrical?

B. *Determination of strokes.* Are the strokes used in a given drawing determined or do they appear to be wavy with continuous change of direction?

C. *Continuity of strokes.* Do the strokes appear to be continuous in a drawing or are they broken and interrupted?

D. *Pressure of strokes.* Does it seem to you that a given artist has used strong pressure or weak pressure in making his drawing?

E. *Expansiveness of drawing as a whole.* How has the child used the space given him? Does the drawing seem to fill the space? . . . On the other hand, the artist may have used relatively little of the space provided him; the drawing may then seem narrow or restricted.

F. *Degree to which graphic elements are centered in the drawing as a whole.* Do the graphic elements within the drawing appear to have some focus? Do they seem to be centered? Or do these contents seem to be scattered over the paper?

G. *Symmetry of individual figures in the drawing.* Do the individual figures in the drawing have symmetry? . . . To what degree?

H. *Sharpness and distinctness of features of individual figures in the drawing.* Are the various parts, whatever they may be, of the persons depicted in the drawing clear and distinct? Or does there seem to be some confusion or blurring in their representation?

I. *Clarity of position of natural features of individual figures in the drawing.* How clear is the placement of such normal features as nose, eyes, ears, hair, hands and trunk of the individual figures?

J. *Expansiveness of individual figures in the drawing.* This rating applies to the individual figures appearing in the drawing. Do the figures seem relatively broad or expansive or do they seem narrow and restricted?

K. *Activity of individual figures in the drawing.* In looking at the figures in a given drawing, do you feel that they are in motion? Or would you say that they are static, motionless?

A Preliminary Study

In order to determine the applicability to the drawings of ratings on variables as have just been listed and also to anticipate the kinds of results which might be obtained in a more definitive study, a preliminary investigation was undertaken. To a class in art education composed of some 24 college students, 5 men and 19 women, there was presented the collection of drawings made by the kindergarten group. For each characteristic in turn these students were asked to judge for all the drawings the amount of that characteristic which they considered to exist in a given drawing by rating on a five-point scale—very much, much, some, little, very little. These raters were told that they could indicate the rating at any point on a given line corresponding to a given characteristic and drawing. Each line was afterwards further divided into ten equal parts and values ranging

from 1 (very little) to 11 (very much) were arbitrarily assigned. No indication was given that the drawings were being considered as anything but artistic products; certainly, there was no hint that the experimenter was interested in a study of the graphic expression of personality.

How well did the judges agree in their ratings on the several scales? Coefficients of equivalence among judges based on the formula given by Hoyt (7) are found in Column 2 of Table II. As can be seen, these are so uniformly high that it can be concluded that virtually the same ratings would have been given these drawings on the various scales had a second

TABLE II

RELIABILITY COEFFICIENTS FOR RATINGS OF CHILDREN'S DRAWINGS

	Coefficients of Equivalence*		Coefficients of Stability*
	Preliminary Study	*Final Study*	
No. of Judges	24	13	*Correlation of mean ratings of 2 groups of 11 judges on drawings*
No. of Drawings	11	31	
Scale			
A	.90	.88	.89
B	.98	.89	.94
C	.95	.83	.94
D	.99	.96	.98
E	.92	.96	.88
F	.96	.82	.84
G	.96	.85	.97
H	.98	.91	.94
I	.98	.93	.94
J	.95	.88	.87
K	.94	.93	.86

* Cronbach (2).

group of judges comparable to the first rated them. On the basis of these preliminary findings, it was decided that a smaller group of judges could be used to rate the total collection of drawings with satisfactory reliability.

THE FINAL STUDY

Raters

The group of judges for the final study included 13 university juniors and seniors, 8 males, 5 females, all majoring in art, ranging in age from 20 to 29.

Procedure

The same scales and scoring procedure were used as in the preliminary study; again, a minimum of instructions was given together with the impli-

cation that the interest of the experimenter was solely in the artistic characteristics of the drawings. The art products were rated in groups, all five-year-old drawings or all first-grade drawings or all second-grade drawings.

In order to minimize the bias in judgment due to fatigue or to practice effect, these measures were taken: (1) The thirteen judges were divided into two approximately equal groups, Group A and Group B; (2) Group A in a single session rated first the kindergarten drawings, then the first-grade and finally the second-grade drawings, while Group B did their ratings in the reverse sequence; (3) The scales on which the drawings were to be rated were presented to no two judges in the same order; (4) No one judge made his ratings in the same order from one collection of drawings to another.

Results

Reliability of judgments

The reliability coefficients computed as before by Hoyt's method are found in Column 3 of Table II. The decreased number of judges in the second group of raters is primarily responsible for the slight but uniform lowering of the coefficients. Even so, they are still satisfactory and demonstrate the great amount of agreement among judges in their ratings on all the scales.

Extent of agreement, preliminary and final study

It may be of interest to determine the relationship between the mean ratings of the two sets of judges for the kindergarten drawings. Pertinent coefficients of stability are contained in Column 4 of Table II and indicate a high degree of agreement, thus giving substance to our contention, on the basis of the estimates of reliability, that a comparable set of judges would give virtually equivalent ratings to these drawings.

TABLE III

CORRELATION OF MEAN RATINGS OF JUDGES ON ALL SCALES

	A	B	C	D	E	F	G	H	I	J	K
A	—										
B	.431	—									
C	.445	.783	—								
D	.444	.828	.561	—							
E	.726	.206	.290	.221	—						
F	.853	.438	.485	.408	.716	—					
G	.247	.567	.172	.572	.006	.213	—				
H	.439	.656	.421	.681	.218	.466	.578	—			
I	.299	.535	.342	.551	.075	.338	.598	.891	—		
J	.617	.253	.295	.282	.691	.560	.155	.412	.210	—	
K	.187	.080	.273	.155	.388	.351	—.047	.198	.176	.565	—
MA	—.364	—.067	—.134	.047	—.316	—.120	.032	.277	.385	—.223	.180

Factor analysis

From the intercorrelations of the mean ratings (Table III), three factors were obtained by Thurstone's centroid method (9). The resulting factor loadings are contained in Table IV. Only six of the third factor residuals are greater than ±.10 (Table V). The axes were then rotated to an oblique simple structure; the results are given in Table VI.

TABLE IV

FACTOR LOADINGS BEFORE ROTATION

	I	II	III	*Communality*	*Uniqueness*	*Specificity* (Estimated)
A	.80	—.40	.13	.82	.18	.06
B	.77	.46	.36	.93	.07	.00
C	.67	.12	.36	.59	.41	.24
D	.74	.42	.16	.76	.24	.20
E	.62	—.60	—.04	.74	.26	.22
F	.79	—.33	—.02	.73	.27	.09
G	.49	.44	—.06	.43	.57	.42
H	.76	.46	—.36	.92	.08	.00
I	.61	.54	—.44	.85	.15	.08
J	.67	—.47	—.26	.74	.26	.14
K	.37	—.24	—.35	.32	.68	.61
MA	—.09	.39	—.48	.39	.61	

TABLE V

THIRD FACTOR RESIDUALS

	A	B	C	D	E	F	G	H	I	J	K
B	—.06	—									
C	—.09	.07	—								
D	.00	—.01	—.05	—							
E	.00	—.02	.05	.00	—						
F	—.09	.01	—.01	.03	.02	—					
G	—.05	—.01	.19	—.04	—.03	—.03	—				
H	—.06	.01	.02	.01	.02	.01	—.01	—			
I	—.09	.02	—.03	.06	.00	.03	.03	.02	—		
J	.08	—.04	.00	—.02	—.02	—.14	.02	.03	—.06	—	
K	.16	—.04	—.18	—.05	.01	—.03	—.14	—.10	—.07	.12	—
MA	.07	.01	—.05	—.04	—.05	.07	—.13	.00	.03	—.10	.13

TABLE VI

FACTOR LOADINGS AFTER OBLIQUE ROTATION

	I	II	III
A	—.09	.69	.14
B	.03	—.06	.77
C	—.13	.15	.56
D	.18	.02	.58
E	—.05	.81	—.15
F	.07	.69	.06
G	.33	—.05	.34
H	.67	.18	.20
I	.74	.07	.13
J	.21	.81	—.24
K	.31	.51	—.28
MA	.56	—.18	—.20

These results might best be interpreted by considering for each factor those scales with loadings above .50 on that factor.

Scales with loadings above .50 on Factor I

I. Clarity of position of natural features of individual figures in the drawings. .74

H. Sharpness and distinctness of features of individual figures in the drawings. .67

MA. Mental age. .56

Variables I and H have to do with the degree of differentiation in the drawing, a characteristic highly related to intelligence (4). (Thus, it is not surprising to find mental age with a high loading on this factor.) Factor I might then be named "Maturity."

Scales with loadings above .50 on Factor II

E. Expansiveness of drawing as a whole. .81

J. Expansiveness of individual figures in the drawing. .81

A. Symmetry of drawing as a whole. .69

F. Degree to which graphic elements are centered in the drawing as a whole. .69

K. Activity of individual figures in the drawing. .51

Here we see variables generally involving the factor of "Balance," with the greater test of the artist's sense of balance in a drawing occurring when he tends to be expansive—that is, tends to distribute the elements of his

drawing over a relatively large space—and when he tends to place his individuals in poses which suggest activity to the viewer.

Scales with loadings above .50 on Factor III

B. Determination of strokes.	.77
D. Pressure of strokes.	.58
C. Continuity of strokes.	.56

These scales describe the "Quality of Stroke," a matter of the motor activity as well as the style involved in graphic representation.

The only scale not included in these three groups is G, which has equal but relatively low loadings on both Factors I and III; thus, it seems to reflect, in part, Maturity in graphic expression and, in equal amount, Quality of Stroke. In addition, it can be seen that it is a relatively unique and specific factor. Except for G and K, and possibly C, all the scales have relatively high loadings on one factor and relatively little or no loadings on the other two; they can be considered single-factor variables.

It is conceivable that in the interests of economy of time and effort, a simplified set of scales might be established for the rating of such drawings, by selecting those which seem most representative of the three clusters as well as those which appear relatively unique (Table IV). In the first cluster, while Scale I has the highest factor loading, H might better be chosen as the one most representative with its higher communality and its necessarily lower uniqueness. In addition, the unique quality of MA makes necessary its retention.

It is difficult to select the one scale most typical of Factor II; in view of the loadings, our choice presumably lies between E and J. Because of its higher reliability, Scale E is probably the better. It should be noted that K has the greatest uniqueness and specificity of the scales in this group—in fact, the greatest of all scales; despite its relatively high loading on Factor II, there is reason to treat K as comparatively unique and significant.

For Factor III, Scale B appears most representative. Moreover, the uniqueness of C should not be overlooked. Thus, by adding Scale G for reasons already noted, we arrive at the following list:

B. Determination of strokes.
C. Continuity of strokes.
E. Expansiveness of drawing as a whole.
G. Symmetry of individual figures in drawing.
H. Sharpness and distinctness of features of individual figures in the drawing.
K. Activity of individual figures in the drawing.
MA. Mental age.

The correlation between the factors after oblique rotation are found in Table VII. Factors I and II are apparently mutually unrelated while there

is a moderate relationship between Factors I and III and between Factors II and III. In other words, we see that "Quality of Stroke" and "Maturity" are related as are "Quality of Stroke" and "Balance," but that "Balance" is not associated with "Maturity." This pattern of interrelationships does not seem to be logically unacceptable.

TABLE VII

CORRELATION BETWEEN FACTORS AFTER OBLIQUE ROTATION

	I	II	III
I	1.00		
II	.10	1.00	
III	.42	.50	1.00

Sex and age differences

While the number of individuals and their method of selection in this study are such that the facts cannot be generalized to any larger population, it may be of some interest to know that there are no significant differences among age groups or between boys and girls in ratings given on the several scales.

Profile stability

The great amount of agreement that exists among the judges in their ratings on the several drawings on each of eleven scales has been demonstrated. Cronbach (3) has suggested the possibility of determining the stability of the profile for a given drawing from judge to judge. He defines a coefficient of profile stability, *epsilon*, as the proportion of the total variance associated with all the ratings on a given drawing which is accounted for by the covariance of each judge with every other judge. This coefficient is comparable to a reliability measure, and is obtained by the formula:

$$\frac{j}{j-1}\left[1-\frac{\sum_{j}\text{Variance between scales for one judge on this drawing}}{\text{Variance between scales, using average rating of this drawing over all judges}}\right]$$

where j = number of judges

A coefficient of profile stability based on all eleven scales has been computed for each drawing and can be found in Table VIII, together with the total variance within each profile.

Of these coefficients, 60 per cent are larger than .80; only one of them is less than .60. The lower coefficients are associated with the flatter profiles. In general, it can be concluded that there is a great amount of agreement among the judges on the profile of ratings for any one drawing. Since a consideration of the pattern of ratings associated with any given

TABLE VIII

PROFILE STABILITY

Drawing	*Coefficient of Profile Stability*	*Total Variance of Average Ratings*	*Drawing*	*Coefficient of Profile Stability*	*Total Variance of Average Ratings*
1	.94	3.62	26	.65	.44
2	.87	2.79	27	.62	.52
3	.86	1.65	28	.84	1.68
4	.89	1.43	29	.94	3.52
5	.89	2.13	30	.83	1.42
6	.76	.86	31	.77	1.45
7	.87	1.66			
8	.92	3.95	41	.83	1.59
9	.95	3.64	42	.49	.38
10	.88	1.97	43	.87	2.36
11	.89	1.93	44	.70	.80
			45	.89	1.63
21	.86	1.38	46	.77	.82
22	.79	.72	47	.78	.95
23	.76	.82	48	.86	1.76
24	.71	.67	49	.90	3.27
25	.63	.37			

drawing is of greater diagnostic value than attention to single ratings in turn, these results have particular importance.

It may be of significance to determine the coefficient of profile stability for the total group or for the various subgroups of drawings. Since the variances are heterogeneous, it is not appropriate merely to take an average. Instead, Cronbach (3) has suggested a weighted mean: the summation of the products of coefficients of profile stability by their respective variances divided by the sum of the variances. The results are found in Table IX. Among other things, it can be noted that the *epsilons* do not seem to be related, in any significant way, to the age of the group.

TABLE IX

ADJUSTED COEFFICIENT REPRESENTING OVERALL PROFILE STABILITY FOR EACH GROUP OF DRAWINGS

Group	*Coefficient of Profile Stability*
Kindergarten	.90
First Grade	.82
Second Grade	.84
Total	.87

SUMMARY

A study of the nature of the ratings on a series of variables suggested as being of significance in the study of personality for a collection of children's drawings has been reported. The artists were young children identified as either most secure or most insecure in their respective groups on a variety of criteria; the raters were university students majoring in art. The major results may be summarized briefly as follows:

1. Ratings on such variables as have been considered can be made with high reliability.
2. A factor analysis of the ratings on eleven scales resulted in the identification of three factors: Maturity; Balance; and Quality of Stroke.
3. A profile on a given drawing as derived from the ratings on the various scales is highly stable from one rater to another.

These results indicate that samples of graphic expression of children can be studied objectively and without contamination from any hypotheses, specific or general, on the relationship between such expression and personality as may be held by the individual experimenter.

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SOME SOCIAL CLASS DIFFERENCES IN THE FAMILY SYSTEMS AND GROUP RELATIONS OF PRE- AND EARLY ADOLESCENTS[1]

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Sociological study of child-rearing practices has resulted in a now widely accepted differential patterning of lower- and middle-class child life. Implications for the mental health of children in these subcultural groups have been drawn from sociological portraits. The purpose of this paper, based in part on preliminary findings in a current study,[2] is to propose a re-interpretation of some social behavioral patterns of pre- and early adolescents in lower-class and core culture families.

Davis and others have characterized childhood in the lower class sociologically by its greater physical and social freedoms; by its delayed but physically severe parental punishments and absence of rewards; by its minimal restraints in expressing aggression and sexuality; and by its generally greater emphases on immediate rather than the delayed gratification of desires (2). In the early years, lower-class child-rearing practices, as revealed in a study by Davis and Havighurst (3), include later weaning and more permissive toilet training than have been the customs of middle-class parents. The etiology of these differences in social-class patterns is seen largely in cultural and economic terms, although the infiltration of Freudian thinking—*e.g.* in the selection of areas for investigation—is apparent. The mental health implications of existing theory have been in the direction of comfort to the lower-class child and of warning to his more controlled middle-class peer,[3] whose socialization is likely to arouse in him an enduring "anxiety," an adaptive response to the pressures and expectations of middle-class training (1). Assumptions underlying such interpretations of the social-class

[1] Data for this paper are derived from a larger study of social class and the behavior of children and youth in organized groups. This research is supported by the Social Science Research Committee of the University of Chicago. Research assistants in the phase of the project reported in this paper are Susanne Artingstall and Victor E. Ricks.

[2] An earlier unpublished clinical study, related to this problem, helped the writer in the formulation of the current investigation.

[3] See especially discussions of how "a lower-class person becomes habituated" to physical aggression which therefore becomes "not an anxiety-producing experience"; "to express violent anger is a tremendously gratifying and cathartic experience . . . and one which middle-class and upper-class people learn to inhibit only at the expense of great strain and anxiety"; re sexuality, lower-middle-class children, unlike lower-class children, are "dangerously uninformed and inhibited"; etc. (2, pp. 271-277).

data are obviously also Freudian in origin, but their high valuation on merely the expression of aggressive and sexual impulses suggests to this writer a rather mechanistic view of Freudian theory. Relationships concomitant with these social acts need study to assay their meaning.

Scope, Subjects, and Methods of Investigation

Starting with a somewhat different developmental orientation—closer to that of the late Harry Stack Sullivan (6)—the writer has been investigating interpersonal patterns among ten- to fifteen-year-old boys and girls in the lower-lower class and in the core culture—the latter subcultural group being an amalgam of W. Lloyd Warner's lower-middle and upper-lower classes (7). Patterns of relationship within the families of these two subcultural groups are being derived through flexibly structured interviews with pre- and early adolescents; their perceptions of their channels of communication and affective freedom at home and with peers are major foci of the inquiry.

The twenty-one subjects studied thus far have been selected (from about fifty children) because of the clearly central, modal, or peripheral nature[4] of their behavior in the five different youth groups observed to date. One may therefore expect a desirable spread in the social "types" within our population, although it might be suggested that the population as a whole is a skewed one to the extent that all social and church agencies draw to

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[4] "Central," "modal," or "peripheral" is used in this paper to classify a member according to whether his behavior usually meets with the approval (central), acceptance (modal), or mere toleration or disapproval (peripheral) of other members. It is a kind of shorthand to refer to *members* as either central, modal, or peripheral; actually what is meant is that their *behaviors* in a specific group and at a particular period are so judged by the group's co-observers and its adult adviser.

For example, in Group CM1, Bob's behavior was judged to be central in the meetings we observed. His program proposals, manner of behaving, and feeling communications were so closely "in tune" with the other members' thinking, mores, and feelings in most situations that he seemed able significantly to affect processes in the group. (Interviews verified our observational inference about his importance to the other members.) In the same club, Neal, the secretary, appeared modal. Neal was "one of the boys," going along with the group cooperatively but not compliantly. As a "fat boy," he was sometimes the target of wisecracks which, up to a point, he took good naturedly. When absent from meetings, Neal was missed by others, but group process was not so obviously affected as, for example, by the absence of Bob. On the other hand, the absence of Chris, a peripheral member, provoked no comments from the boys. In fact, Chris attended irregularly. Not the quantity but the quality of his participation at meetings suggested the tangential nature of his behavior with group members. His occasional proposals were ignored or quickly dismissed. His chief means of maintaining relationships in this group was to comply. In this group irregular attendance and compliance were peripheral behaviors.

Note that the specific behaviors that appear central (or modal or peripheral) in Group CM1 may be quite different from behaviors that seem central in another group, or even perhaps in Group CM1 in another period of its history.

their youth groups members who are atypical for their social class. This, at least, has been a contention of one sociologist about lower-class members in social settlements (8), but to this writer's knowledge it remains a moot generalization, not a universal fact, if only because our subjects present so many data that are identical with the findings in earlier studies. The social-class memberships of our subjects were determined by the use of Warner's scales, including items on parents' occupation, source of income, education, ethnicity, and religion (7).

Our inquiry into the psychological as well as the social distances that characterize the subjects' relations with their parents, siblings, and peers has been reduced to such operational questions as (phrased in interviews, of course, both indirectly and concretely): "How do you express anger at home, and to whom?" Our data thus far repeatedly confirm Davis' observations on the greater social freedom and physical aggression that mark the lives of lower-class children, but they lead us to question the alleged resulting *psychological* freedom of the lower-class child as well as the ulcerating anxieties of the middle-class scion (despite Ruesch's findings on such psychosomatization in *later* middle-class life (5)).

Family Systems in Lower-Class and Core Culture

The patterns in our data suggest, in the lower class, a psychologically closed, hierarchical, and quite rigid parental relationship with children; in the core culture a more open, ostensibly equalitarian and flexible relationship. Lower-class parents are repeatedly seen as closed or inaccessible to the child's communications, especially of the milder types of disapproval or refusal of parental expectation or demand. Relationships between the parents being hierarchical, the father often the possessor of the mother, the child is once removed, for these or other reasons, from direct communication with one parent or the other. Fear of parental authority and its explosive anger mutes the child, until he explodes in similar manner or redirects his hostile aggressions, as well as his tender feelings, toward siblings or other contemporaries. With them, he may become either a prototype of the bully—status and power seeking—or an ever-submissive follower.

In the core culture today, however, parents appear to be open to the child's gainsaying parental requests—or so the children *feel*. Father and mother, being relatively equal powers in the child's eyes, are equally accessible to him. Socially, they invite him to share their activities or plan for special events with him. Psychologically he seems free to express both positive and negative feelings toward his more frequently adaptable parents; they have been found to modify decisions when the children, openly exploring their manipulative techniques, have sought extensions of parental limitation. The core culture children in our study do not seem either to fear or to identify with the potentially threatening power of adults.

Physical and social freedom among lower-class children seems to be accompanied by intense fear of parents and often feelings of rejection or unworthiness for disobedience—*i.e.* expressing one's own mind. Such a psychological pattern may be clearly inferred from data on at least nine of our eleven lower-class subjects—seven boys and four girls, seven Negroes and four whites, ages eleven to fifteen. A fifteen-year-old white boy (central in his group) says: "I get a crack across the face when I talk back . . . I never try getting mad, I get over things like that real quick." A thirteen-year-old Negro boy (central in the group): "You get tired of doing what you're told to do all the time." Unable often to respond directly to the razor strap at home, however, he fights with his brothers and bullies others in the club. Having to wash all the dishes regularly, an eleven-year-old Negro girl (peripheral in club) says, "Sometimes I get mad and let them stack up in the sink for a while, but then I go back and do them 'cause I know I have to do them, my mother'll be mad at me if I don't." A twelve-year-old Mexican girl (modal in club) says, when her mother is angered, "She always chases us out of the house." An aggressive twelve-year-old Negro girl (central in club): "Folks [like her mother], they like children when they're little, but when they grow up they don't like them so much."

Among eight of the ten core culture early adolescents, six girls and four boys, all white, ages ten to fourteen, the psychological picture at home clearly lacks the forceful pressures of parental (and circumstantial) absolutes. It reveals our subjects' limitations on physical freedom, but also their comparatively open communication with parents and greater freedom to express disagreements and negative feelings, particularly of a minor nature and regularly from day to day. A ten-year-old girl (central in group): "Oh, yes, quite often Sis and I get together and then we're very polite and we say, '*Please* won't you take us to the carnival?' '*Please* won't you take us to the beach?' and very often they do." This girl has no imperative duties at home "except to keep my clothes picked up." A fourteen-year-old boy (central in group): "My Mom and Father are not strict with my brother and I. That's the way it is, the polite way, of course. We have a right to view our opinions. It's a better home life. It's your duty to say how you feel . . . Everyone at home's as close as you can get." Another fourteen-year-old boy (peripheral in group) said he talks with his father about baseball, what his father does at work, their vacations—"a lot of things. They're never too busy." A third fourteen-year-old boy (central in group): "What do I do when I get mad? I just hold it in. Then after awhile it overflows and I stomp around and yell. It doesn't last long. . . . My parents are pretty strict. I'm not out after dark. I've never been downtown by myself. It was only about a year ago I could ride my bike on the street or go on the streetcar alone. I think it's good. . . . Dad plays catch in front of the house with me. He helps with designs on the board in the basement. . . . Mother plays games with us too. In the summer we always go to Milwaukee for a family reunion. And we have picnics out in the forest preserve and play ball." A

ten-year-old girl (modal in group), when she is angry at her parents: "Well, I say to my dad, 'I hate you, I hate you,' and then I go to the bedroom and shut the door and cool off. Then my mother is nice to me after that for awhile and then my father talks to me in a serious tone. Sometimes I say, 'I hate you, I hate you,' and my mother says 'I'm not going to have anything to do with her,' and then I don't have to listen to that serious talking-to she gives me." Another ten-year-old girl (peripheral in group), if her room, shared with sister, is not straightened up: ". . . so my mother first lets it stay like that until we straighten it up and sometimes we have a woman come and clean for us and then she straightens it up." Of this girl's mother's refusing permission for her to ride her bicycle: "Well, my mother can't stop me from riding it very well [giggling] 'cause I wear the key around my neck." Asked what her mother punished her for, she said, "Well, she doesn't usually, but sometimes at night my sister and I will be talking in our bedroom and she will come in and pretend to be very angry and pretend that she is going to whip us, but she just scolds us and tells us to go to sleep—so we talk for about fifteen minutes or so and then we go to sleep."

Group Relations in Lower-Class and Core Culture

Children's freedom in communication with parents and the lesser degree of fear in core culture families may be related to the nature of the psychological bonds in the peer societies of the two subcultures. In core culture peer groups we note generally a much less dependent relationship among siblings and peers than we tend to find in the submissive-bullying hierarchies of lower-class pre- and early adolescents. The lower-class child, allowed an ostensibly longer infancy through later weaning and toilet-training—a period of dependency that is apparently most acceptable to lower-class mothers—nevertheless seems to have his dependent relationship on parent-figures abruptly terminated; when he is no longer a baby, he is a rover of the streets and alleys late into the night, often with other children but without adults. While this allows for social and physical freedom, it may be felt personally, despite subcultural sanctions, as parental rejection. Subsequent needs for intimate relationships must be satisfied chiefly by peers and sibs, if at all. The middle-class child, if earlier weaned and toilet-trained, nevertheless retains a proximate relationship with parent-figures under whose surveillance he remains; there is evidence of continued adult interest in his growing up, and for him the transition to independence is far less abrupt. The mere prolongation of parental attentions is, of course, of no predictive significance in child development unless the nature of such protracted parent-child relationships can be shown to be either growth-stimulating or stunting. Since situations that permit one to be one's self without fear or defense are considered psychologically productive, the greater openness in daily child-parent communication in some core culture families—as compared with some lower-class families—would seem to be growth-stimulat-

ing. Relationships with peers, essential to the otherwise isolated lower-class child, seem also less imperative or urgent for boys and girls in the core culture.

Our data on the peer relations of lower-class children repeatedly present two types of security-seeking relationship: one in which the child identifies with power and needs peers to establish his high status in relations with his contemporaries; the other in which he seems desperately dependent upon their physical presence for mutual succorance and direction. Examples of status relations are suggested by a thirteen-year-old Negro boy's statement, validated many times over by his behavior in the group, that he joined the club because "They won games when I played. When I didn't come they lost"; a fourteen-year-old white boy's primary appreciation of life in the club, as compared with home, because "you can act smart with the officers of the club, but not with your parents"; a twelve-year-old girl's constantly hostile belittlement of her peers and siblings, without whose presence she seems lost. Coupled with these data are other children's references to the "show-off" and "big-shot," indicating an awareness of hierarchical structures in lower-class peer society. Examples of lower-class submissive and fearful dependence on contemporaries are one twelve-year-old girl's strong denials of rivalry with her siblings, and, speaking of her peers, "Well, when M and E suggest something, I go ahead and do it. Otherwise I wouldn't have any more friends. . . . If I had ten dollars, I would take R and L to the carnival and treat them to rides and buy them candy and popcorn and hot dogs"; an eleven-year-old girl's approval of others who stay and play with you, not like others who run off and leave you so you don't have anyone to play with. The lower-class child's primary security-giving relationships seem to be with peers. Adults repeatedly, physically and perhaps psychologically, have left him. His feelings about the necessarily indirect nature of communications with adults, who are so inaccessible in the lower class hierarchical social structure[5] and/or so fear-inspiring, are thus understandable. This pattern is superficially diagrammed by one girl's unwillingness at any time to speak up at a club meeting to say she did not like what was being done; if she did speak up, she remarked, *the other children might get mad at her* and *then* tell Miss B and make the story sound much

[5] That people in the lower class often seem to see the world as a hierarchical system and to act accordingly is independently supported by Whyte's conclusions in his study of an Italian slum community: the people in this area "conceive society as a closely knit hierarchical organization in which people's positions and obligations to one another are defined and recognized. . . . According to Cornerville people, society is made up of big people and little people—with intermediaries serving to bridge the gaps between them. The masses of Cornerville people are little people. They cannot approach the big people directly but must have an intermediary to intercede for them. . . . The interactions of big shots, intermediaries, and little guys build up a hierarchy of personal relations based upon a system of reciprocal obligations." (9, pp. 269, 271). Is this larger social pattern circularly related to the psychological distance in lower-class parent-child relations, as suggested in this paper?

worse, and *then* the "leader" would be mad at her too. Other children anticipate such anger from an adult and do everything to provoke it—as though to make real their expectations—when they appear inappropriately hostile, either covertly or openly. Perhaps hostile communications with adults, so familiar to many of these children, are better than none.

The range of peer relationships among core culture children seems somewhat wider. Individual competitive achievement and team play rather than bullying, self-exclusion rather than submission, and the absence of any underlying feeling of desperate dependence on peers characterize our core culture children's group relations. There is always a home to retreat to where there are things to do and adults accessible to and interested in one's life. One girl lists her friends, explaining that she sometimes gets angry with one or two of them because, for example, "G never wants to play any [games] that I want to; and when I go ahead and play the game, then she gets mad and shouts at me and calls me names . . . well, I just ignore her, and when she asks me questions I don't answer her. I don't talk to her. Then after awhile, after I've left her alone for awhile, then she forgets all about it and then we play together again . . . I like G and I want her to be my friend." Boys in the core culture do not want non-participant ("wall flower"), repeatedly hostile ("a guy who can't take jokes," "a guy who holds grudges"), unsportsmanlike ("a hard loser"), or unruly ("rowdies") members in their groups. Getting angry is all right, but not staying that way. Girls similarly do not like non-participant (one who is "slow") or unfair ("a cheater") members. At home, there are yards for playing in and growing gardens, an accordion or a piano to play, a basement to work in, an eagerly anticipated move to California to plan for, Twenty Questions to be played with mother. In such a setting there appears to be psychological space for movement and relative freedom in relationships with both peers and adults.

Implications

The hierarchical world of our lower-class pre- and early adolescents is one of imperatives and absolutes, physical violence at home (and in the school and community), and psychological distance from, if not actual rejection by, adults. The world of our core culture subjects, while more circumscribed for independent social exploration, seems more open for psychological exploration with both adults and peers. These patterns, interpreted from data of the type cited and reinforced by observations of our subjects in action in organized groups, suggest that the limits of child life in the core culture may not be quite so psychologically limiting as previous research has indicated. Moreover, the lower-class child's social and physical freedoms, to which the transition may be abrupt and for which the timing may be psychologically premature, often foster (among our subjects) excessively dependent relations with contemporaries and a kind of psychological distance

from adults in pre- and early adolescence that may be undesirable for these developmental levels in our society.

One fourteen-year-old lower-class boy says of his group's adult adviser, "If he could do everything, that would be nice . . . most of the guys, me too, like to loaf around and let the other guy do the work." This boy was reared in a family in which communication and particularly the exchange of feelings with his foster parents were minimal—except for their occasional punitive outbursts to which he responded with apparent submission at home. He and others like him may remain comparatively comfortable, continuing to be dependent and removed from spontaneous sharing (lateral) relationships in a rigidly structured and closed (hierarchical) socio-psychological system—whether in a family, other small groups (4), or larger societies. A more flexible, open system of communication between parents and children, however, is apparently more highly valued in some American core culture families today. Such a system cannot operate in a world conceived as fixed and excessively limiting to the individual. Such a system encourages individual participation, the expression of appropriate adverse criticisms, and desired modifications in process.

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A FURTHER ANALYSIS OF REPORTS OF WILD CHILDREN

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Some time ago I examined the literature on children who allegedly had lived for several years in isolation or in company with animals (2). The references to these cases have appeared over a period of many centuries. A detailed examination of the accounts led me to the conclusion they were of little value for any scientific purpose.

Yet these cases are frequently cited to show that children reared by animals adopt animal traits and, more generally, that early childhood influences are relatively permanent in their consequences. In general, it cannot be questioned that the alleged wild children have been unsocialized when captured and few of them have exhibited much improvement even after several years in society. Most of them have many traits in common with imbeciles and idiots as well as traits of infrahuman animals. It was my interpretation that instead of these individuals once having been normal and then having become permanently altered by association with animals, it seems more likely that most of them were originally mentally defective and remained mentally defective whether with animals or with men. Reasons for this interpretation were presented in some detail in my earlier paper (2).

I would have been content to let the matter rest at this point but I am prompted to return to the topic by the fact that several recent writers have supported the traditional interpretation of the behavior described in the accounts of wild children. Ruch, in a widely used introductory textbook (4, pp. 152-153), cites with approval Singh and Zingg's (6) account of Amala and Kamala. Anastasi and Foley (1) devote eight pages to feral man and conclude "When a child is brought up in contact with animals, striking similarity to the behavior of those animals is exhibited, and such behavior proves difficult to eradicate once it has become firmly established. Subsequent educational efforts are inadequate to undo the effects of early nurture" (p. 189). Sargent, in a recent text in social psychology, says (5, p. 88) "Two different interpretations of feral cases are given. The one favored by sociologists, and by some psychologists and anthropologists, is that feral children are unhuman and retarded because they have been denied human social experiences at their tenderest and most formative period . . . The author is inclined toward this view."

In my earlier discussion I attempted primarily to question the belief that so-called wild children were basically normal and the belief that they had been reared by animals. Since, however, it is clear that my arguments did not convince all readers, let me assume, for the sake of discussion, the oppo-

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site viewpoint in order to see what will issue from it. That is, if wild children were basically normal and if they were reared by animals and if they were later incapable of normal human behavior, what does this indicate with regard to the crucial period for socialization? In this paper, therefore, I am accepting the data on wild children at their face value, for a while, to see what conclusions follow from the data. Only those cases will be used in which some statement is made concerning the probable age of the child during his animal association, since obviously one cannot draw conclusions about the formative years without age data concerning the subjects. For data on wild children I shall use the case summaries presented by Singh and Zingg (6) which is by far the most comprehensive summary to date.

Ideally, one should know the age and behavior of each case at the time of his isolation, the nature of his experiences during isolation, his age and behavior at his return to civilization, and the subsequent course of his development. One could then relate his period of isolation to his subsequent behavior.

Such full data are not available for a single case. In only six of the thirty cases of alleged animal-reared children reviewed by Singh and Zingg are there sufficient data to justify any discussion in the present connection.

The reports of age at isolation are based upon claims of recognition of the identity of lost and recovered children. The estimated age of a child at recovery is sometimes based upon the appearance of the child, and sometimes upon the assumption that he is a particular lost child whose age is known.

In preparing the brief case histories presented below, I have abstracted the relevant facts from the literature compiled by Zingg. Each case is referred to by the number which has been given to it by Zingg. The comments concerning the cases are mine. The abstracts of the case histories and the comments concerning them follow:

Case II—A Wolf-Boy of India

estimated age at isolation: 3 years

estimated age at discovery: 9 years

behavior at isolation: was led by his mother to the field from which he was stolen; no other data

behavior at discovery: ferocious, bit at captors, ate nothing but raw flesh, dipped face in water to drink, went on all fours, tore off his clothes

recovery: never learned to speak, very little improvement

comment: habits learned before 3 years of age disappeared; habits learned between 3 and 9 years persisted.

Case V—A Wolf-Boy of India

estimated age at isolation: 6 years

estimated age at discovery: 10 years

behavior at isolation: no data

behavior at discovery: ate everything but smelled objects before eating them, preferred undressed meat, ran on all fours, could not talk

recovery: learned to walk, no other data

comment: habits learned before 6 years disappeared; habits learned between 6 and 10 years persisted.

Case VI—A Wolf-Boy of India

estimated age at isolation: 4 years

estimated age at discovery: 10 years

behavior at isolation: no data

behavior at discovery: bit captor, tore captor's clothes, ate raw flesh, cut ropes and escaped, went on all fours, could not speak

recovery: learned to walk, learned to obey signs but never learned to speak

comment: habits learned before 4 years disappeared; those learned between 4 and 10 years of age were permanent; very little learning after 10.

Case VII—A Wolf-Boy of India

estimated age at isolation: exact age unknown but less than 4 years

estimated age at discovery: 4 years

behavior at isolation: no data

behavior at discovery: sat like a dog, hopped like a monkey, never stood up, kept hands on ground, snarled, ate only raw meat

recovery: went to school, eventually became a policeman

comment: habits learned before 4 years disappeared; socialization was reestablished after 4 years to the extent of becoming a policeman.

Case XI—A Leopard-Boy of India

estimated age at isolation: 2 years

estimated age at discovery: 5 years

behavior at isolation: no data

behavior at discovery: ran on all fours, bit at people, at raw flesh

recovery: learned to walk, to eat vegetables, and to be friendly

comments: socialization before 2 years lost; some socialization reestablished after 5.

Case XXVI—A Bear-Girl of India

estimated age at isolation: exact age unknown, but less than 3 years

estimated age at discovery: 3 years

behavior at isolation: no data

behavior at discovery: ferocious, attempted to bite and scratch, ran on all fours, growled like a bear, ate and drank like a bear

recovery: learned to walk, eat and drink like a human being, laughed often and loudly, did not learn to use or to understand language

comment: socialization before 3 years lost; only partially reestablished after 3 years.

Let me now try to summarize these cases. Four of these children were presumed to have been lost, respectively, at 3, 6, 4, and 2 years of age. In two cases the age is not estimated except that it was less than 3 and less than 4 years, since they were recovered at these ages. If we presume that these children were normal, at the time of their isolation most of them must have been walking and talking to some extent, must have learned to prefer cooked foods, must have learned not to bite and scratch, must have smiled and laughed and have been not only unafraid of people but actually preferred them to animals or to isolation. If they had acquired such behaviors, then all of these socialized habits were lost during isolation. In other words, the data would show the ephemeral character of that socialization which occurs very early. This is exactly the opposite of the point which these cases are ordinarily used to demonstrate.

The presumed periods of isolation lasted up to three years of age in the youngest case and up to ten years of age in the oldest. In general, upon return to civilization, these children were said to have had animal habits. After return to society they lost these to varying degrees. Case VII, who when recovered at 4 years sat like a dog, hopped like a monkey, snarled and ate raw meat, recovered sufficiently to become a policeman. None of the others learned to speak, although all seem to have learned to walk. Two other cases, one recovered at 3 years and one at 5 years, showed little improvement thereafter. The data are therefore inconsistent in regard to the age at which the child must be restored to society if he is to become truly human. Case V did not become a wolf-boy until the age of 6 yet he could not be humanized when he returned to civilization at 10 years of age. The three cases who were returned to civilization at 9 and 10 years were not successfully socialized thereafter.

Another way of summarizing these data is as follows: all cases, regardless of the age at which they were isolated, changed from humanlike to animallike creatures during their period of animal companionship. At later ages, regardless of the specific ages, only one reversed this change

upon return to society. The early human traits were readily overcome by animal association, the animal traits were in most cases never overcome by association with people. One possible interpretation of the data would be that the change from human to animal is easier than the transformation from animal to human.

In summary, what these data lead us to believe is that children adopted by animals lose their human behavior, regardless of the age at which they are adopted. Far from providing evidence that early behavior patterns are permanent, they provide evidence for just the opposite.

But here let the pretense end. The evidence discussed here would not be admitted as evidence in any court of law and should not be seriously considered as evidence in psychology. If we have no better evidence than this for the crucial character of the early years, let us drop the matter altogether until we have better evidence. But at any rate, let us not add bad reasoning to bad data. If we present data alleged to show that children adopted by animals at 3, 4, 5 and 6 years of age conform to their adoptive parents' standards, let us not argue that this shows the permanence of habits established before three years of age!

Lest my suppositions about children being reared by animals be misunderstood, let me reassert that I still question, as I did previously, that children have actually been reared by animals. In replying to my objections, Zingg referred primarily to Amala and Kamala, wolf-children of Midnapore. Without in any way doubting that they were dug from a wolf-den, it must be indicated that no one knows how they came to be there or how long they had been there. The repeated assumptions by Singh, Zingg and Gesell that they had been with the wolves for a considerable period is entirely gratuitous. It is possible to observe that children were rescued from a wolf-den but it is clearly an impossibility for anyone to be an eyewitness of day-by-day association between children and wolves. The evidence on the rearing of Romulus and Remus is every bit as good as the evidence concerning the rearing by wolves of any children, including Amala and Kamala.

Summary

The literature on alleged animal-reared children, assembled by Zingg, has been examined for cases whose accounts give estimates of the age at which these children began their association with animals. Six cases were reviewed. The ages at which they were supposed to have left human society varied from age two to age six. Their return to society was judged to have occurred, in various cases, between age three and age ten. Regardless of the age at which they were believed to have begun association with animals, all were animallike upon discovery. Only one of the six ever achieved normal human behavior after his return to civilization. It is indicated that, taken at their face value, these data show two things: that the socialization

which ordinarily takes place during the early years is readily lost upon close contact with animals; that animal influences are relatively permanent.

Rather than accept these conclusions, it seems better not to attempt to draw generalizations concerning childhood from data so tenuous as the reports on alleged animal-reared children.

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NEWS NOTES

Carnegie Corporation of New York has granted $130,000 to the Social Science Research Council for continued support of the Council's program of area training fellowships and travel grants. The grants are designed to provide a period of field study for highly qualified specialists on foreign areas.

The National Teachers' Research Association is planning a research clinic to be held August 6-11 for the benefit of teachers, administrators and members of educational institutions seeking to improve their efficiency through research. This Association is a non-profit educational and professional organization with a program designed to develop and facilitate research.

The Audiology Foundation will this year be able to offer a limited number of grants-in-aid to students entering into or already engaged in any branch of Audiology, including Otology, Audiometry, Speech, Acoustics, Education of the deaf or hard of hearing. These grants-in-aid will pay $500 per year and will be granted on the recommendation of professional teachers in audiology centers.

For further information in regard to these grants please write The Audiology Foundation, 1104 South Wabash Avenue, Chicago 5, Illinois.

Hunter College of the City of New York, Department of Education, has prepared "An Annotated Bibliography of Research and Educational Studies at Hunter College Elementary School for Young Gifted Children." Copies of the bibliography will be mailed gratis to any interested educators who will make request on institutional letterhead to Frank T. Wilson, Director of Research Studies, Hunter College Elementary School.

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Child Development, one of three publications issued by the Society for Research in Child Development, Inc., is issued quarterly in March, June, September and December. The subscription price is $6.00 per year, postpaid. A limited supply of back issues is available at $1.25 per number. Until the supply is exhausted, available numbers, Volumes 1 to 21 inclusive, may be obtained for $46.00

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Child Development Abstracts and Bibliography, published in cooperation with the Children's Bureau of the Federal Security Agency, Washington, D.C., is now in its twenty-fifth volume. This publication is issued February through December —six numbers to a volume. The subscription price is $5.00 per year, postpaid.

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